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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Investigation of Stock Diseases.

QUEENSLAND is one of the healthiest stock-raising countries in the world, and as far as the inculcation of sound principles of animal husbandry and appropriate legislation can be applied, every effort is being made to keep it so. New problems, however, arise from time to time, and with the object of providing additional means for their solution a Bill is now before Parliament. On its initiation in committee, the Minister for Agriculture and Stock, Mr. Harry F. Walker, explained that its purpose is simply to provide for the imposition of a small levy—1s. for every 100 head of horses and cattle—the amount so raised to be applied to the investigation of stock diseases all over Queensland. The work will be under the control of the Council for Scientific and Industrial Research, and the Townsville Stock Experiment Station will be the base of operations.

Stockowners will in future only pay one assessment, and the division of the fund will be proportioned appropriately. They have already expressed their approval of the proposal, knowing the practical benefits that must accrue. It is just another avenue for scientific investigation as applied to rural industry, and of which the economic value is becoming appreciated more widely. While the Council will direct and control investigations, the Department of Agriculture and Stock reserves the right to make use of the services of the station staff.

The Townsville station was selected because of its position in an important centre of our Northern cattle country, and of the necessity of having a well-equipped and accessible laboratory. Liaison will be maintained through the field officers of the Department.

Manufacture of Margarine.

TWO main purposes are sought in the measure now before Parliament to amend "*The Margarine Act of* 1910," namely, to protect the butter industry by ensuring the sale of the substitute on its merits alone, and to protect the purchaser of margarine. Briefly, it is aimed to protect Queensland butter from unfair competition on its own market from a more or less palatable substitute imported from other States. The Minister, Mr. Harry F. Walker, in the course of a notable second reading speech on the measure, reminded the Assembly of the great importance of the dairying industry to Queensland. It means a very large increase of new wealth every year to the State, besides being helpful to other industries. It has been the means of settling large tracts of our coastal and tableland country. It is one of the best land-settling agencies we have, the average area in many districts being round about 160 acres. There are no finer types of settlers than those engaged in the dairying industry. Approximately £35,000,000 are invested in dairying in the State, and its annual value is about £8,000,000. Production of butter alone last year totalled 92,894,213 lb. The value of the exportable surplus was £3,326,099. The national value of the industry is reflected generally in our commerce and trade statistics. Large cities like Toowoomba, Gympie, Maryborough, Bundaberg, and Rockhampton owe much of their prosperity to the success of the dairy farmer.

The Menace of Margarine.

DEALING with the menace of margarine, the Minister added that butter and the name "butter" are the goodwill of the manufacturers of that commodity, and the rights of the dairy farmer to that goodwill should be preserved by law. Those who have helped in the development of the industry are proud of their work. The butter factories of Queensland are among the most modern manufacturing plants of their kind. Owned and operated by producers through their farmer directorates they have won a great name for their product, both at home and abroad. Queensland butter has secured the highest awards in open competition in the United Kingdom and elsewhere. Why then, he asked, should an industry, the economic value of which was of such importance to the State, be allowed to remain subject to insecurity through the competition of a much less nutritious substitute?

The wholesale price, continued Mr. Walker, of margarine containing a butter blend imported into Queensland is 10d. a lb., and the retail price 1s. to 1s. 1d. The materials used included, in recent importations, beef fat and vegetable oils, such as cocoanut oil, cotton seed oil, and peanut oil. Last year the Cotton Board sold over 240,000 gallons of cotton seed oil, of which 200,000 gallons were purchased by Southern margarine manufacturers. The Bill would not affect those sales. The margarine makers would be at liberty to use those by-products; but their imitation of butter would not be permitted.

Interesting Analyses.

REGARDING the relative analyses of different brands of margarine as compared with butter, although it is almost impossible to ascertain the difference between one fat and another on the basis of analyses, Mr. Walker submitted an interesting series of analytical tables. Typical Queensland butter on analysis showed the following content:—Butter fat, 83.48 per cent.; moisture, 14.71; salt, 1.22; casein, .59; totalling 100.00 per cent.

An analysis of a typical margarine used for cake and pastry making gave the following result:—Colour, pale yellow; aroma, clean fat; flavour, salty tallow; consistency, homogeneous; melting point, 38 deg. centigrade; moisture, 12.5 per cent.; fat, 84.0; casein, .5; salt, 3.0; totalling 100.0 per cent. Artificial colour, nil; boric acid, nil; starch, present; sesame oil, nil; cotton seed oil, nil; butter fat, nil; skim milk, present.

While an analysis of a sample of margarine containing butter, and which could easily pass as butter, was made up of—Moisture, 10.5 per cent.; common salt, 1.5; casein, 1.1; fat, 86.9; totalling 100.0 per cent. Butter fat present, 10.0 per cent. melting point of fat, 21 deg. centigrade; starch, present; cotton seed oil, nil; boric acid, nil; sesame oil, nil; added colour, nil; natural colour, pale yellow; appearance, aroma, and flavour, like butter.

Those comparisons, however, do not give very much information. The analyses do not disclose the quantity of butter compounded with other substances and sold as butter, or as a thinly disguised butter substitute. Mr. Walker distinguished between the makers of margarine as such, and the blenders of butter with margarine. Until lately the latter had made no attempt to exploit the Queensland market, because of an impression that margarine containing butter was banned. A weakness in the principal Act was discovered, however, and consequently a commencement has been made to market here a margarine containing as high as 10 per cent. of butter.

Vitamin Values.

MR. WALKER, continuing, referred to the vitamin value of the two products. Butter contains necessary vitamins, while vegetable oil substitutes are almost entirely devoid of them. The comparatively small quantity of butter added does not improve appreciably the vitamin content of margarine. The ease with which margarine can be substituted for butter is causing concern, not only in Queensland and Australia generally, but in all countries of the world. Canada prohibits the manufacture or importation of margarine. New Zealand bans the use of butter or milk in the manufacture of margarine, only other animal or vegetable fats being permitted. South Africa permits the manufacture of margarine for culinary purposes only. The United States of America has a 10 per cent. tax on margarine, equal to 5d. a lb. New South Wales limits its butter-fat content to 10 per cent., and Western Australia to 5 per cent. The 1927 conference of Ministers for Agriculture recommended that the use of all milk products should be prohibited in the manufacture of margarine, and that existing legislation should be altered to give effect to this where necessary. The Queensland Act already met the terms of that resolution, and the amendments proposed in the Bill will merely remove anomalies. There is no new or vital principle involved. Other States are enacting similar measures, and the protective legislation will be welcomed by dairy farmers throughout the Commonwealth.

Protecting Honey Producers.

HONEY production is as yet a minor factor in our rural economy, but there are evidences that it will one day expand into an industry of major importance. There is unlimited scope for its development in Queensland. In order to protect and regulate the industry a Bill, introduced by the Minister for Agriculture and Stock, Mr. Harry F. Walker, is now before Parliament. Disease prevention is one of the main purposes of the measure, while other important points in the practice of apiculture will be subject to common sense regulation. In the course of his second reading speech, Mr. Walker gave some very interesting facts on the industry in its present stage of development, and forecast a profitable future for it in this State. There are at present about 13,000 productive bee hives in Queensland. The 1929 figures were 12,810 hives, from which 714,068 lb. of honey were extracted, an average of 56 lb. a hive. At 4d. or 5d. a lb., the present price of high grade honey, the possibilities of apiculture as a profitable farm sideline can be estimated easily. In the same year 10,739 lb. of beeswax were also produced. The output in Queensland is pooled under the control of the Honey Board which has already done particularly good work, in spite of the limited home demand and an export trade affected adversely by the prevailing economic conditions. Our apiaries are, fortunately, free from disease and the new measure is designed to keep them so, as well as to provide regulatory services similar to those given under existing laws relating to stock and vegetable life. It will apply to producing districts only, and there is no intention of interfering with people who keep bees for their own domestic requirements. On the other hand, everything possible will be done to expand the industry on sound, economic lines. One important provision is the recognition of the right of every beekeeper to a particular area free from encroachment. Selling will be restricted to honey produced from registered apiaries, and in this way the occurrence and dissemination of disease will be guarded against. With the same object, imported honey will be subjected to rigid inspection. Though wide powers will be conferred under the proposed law, it is understood that none of the provisions of the measure will be applied unless there is a necessity for its imposition. The measure has the full approval of those engaged in the industry, whose practical knowledge has been drawn on in its construction.

QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

PART XIX.

(d) The Employment of Coloured Labour.

ALTHOUGH the introduction and final deportation of kanaka or Polynesian labour in the sugar industry has been mentioned before in this history, it is felt desirable to devote another section to the subject for the reason that such labour played so large a part in the earlier stages of the industry, and was the subject of so much bitter recrimination and feeling from time to time. In his history of Queensland politics during sixty years (1859 to 1919), Mr. C. A. Bernays, Clerk of the Parliament of Queensland, deals with Pacific Island immigration at some length, and I have his permission to make some extracts from his interesting volume as follows:—

Pacific Island Immigration.

"August, 1863, nearly four years after the establishment of responsible government, marks the beginning of an experiment in this State which, all things considered, it might have been well had Queensland never made. It was at that date that Captain 'Bobby' Towns landed from the schooner 'Don Juan' the first consignment of the soft-eyed, soft-spoken kanaka, who played so large a part in subsequent years in the development of our great sugar industry. Originally imported here for the purpose of cotton cultivation in the Logan district, it was not long before Captain the Hon. Louis Hope, M.L.C., followed suit, and applied this class of labour to sugar-cane cultivation in the same district; and from this small beginning the practice of indenting Polynesian labour grew into a vast and flourishing industry until the sugar lands of the North practically produced their crops wholly by its aid. Perhaps, to be strictly accurate, it would be more correct to use the word 'Melanesian,' for the dark-skinned islanders who voluntarily came here, or who were brought here under various pretexts, hailed more exclusively from Melanesia than from Polynesia. Nevertheless, they were always known in Queensland as 'Polynesians,' and so they must be termed in this necessarily brief reference to the history of kanaka labour in Queensland. Who could have believed that the advent of this, perhaps the least objectionable class of black labour, would in time to come have led, as it undoubtedly did, to the division of political parties, to bitter political strife, to acute personal differences among our leading politicians, to numerous social evils of varying kinds, and in the ultimate to shocking tragedy—murder, rapine, kidnapping, and all the violence attendant upon buccaneering in its very worst forms. So large a part did this trade play in legislation and administration extending over a long series of years, that the subject could by no means be overlooked when relating the political history of the State.

"Evil as the whole trade was, blighting as it ultimately proved upon our social and political life, yet the curious fact remains that the kanaka, *per se*, was, as a rule, a peaceable, law-abiding, kindly disposed savage, wonderfully responsive to any act of benevolence, suited to the work for which he was imported, moderately industrious, astonishingly faithful to those who gained his confidence, and with no particular

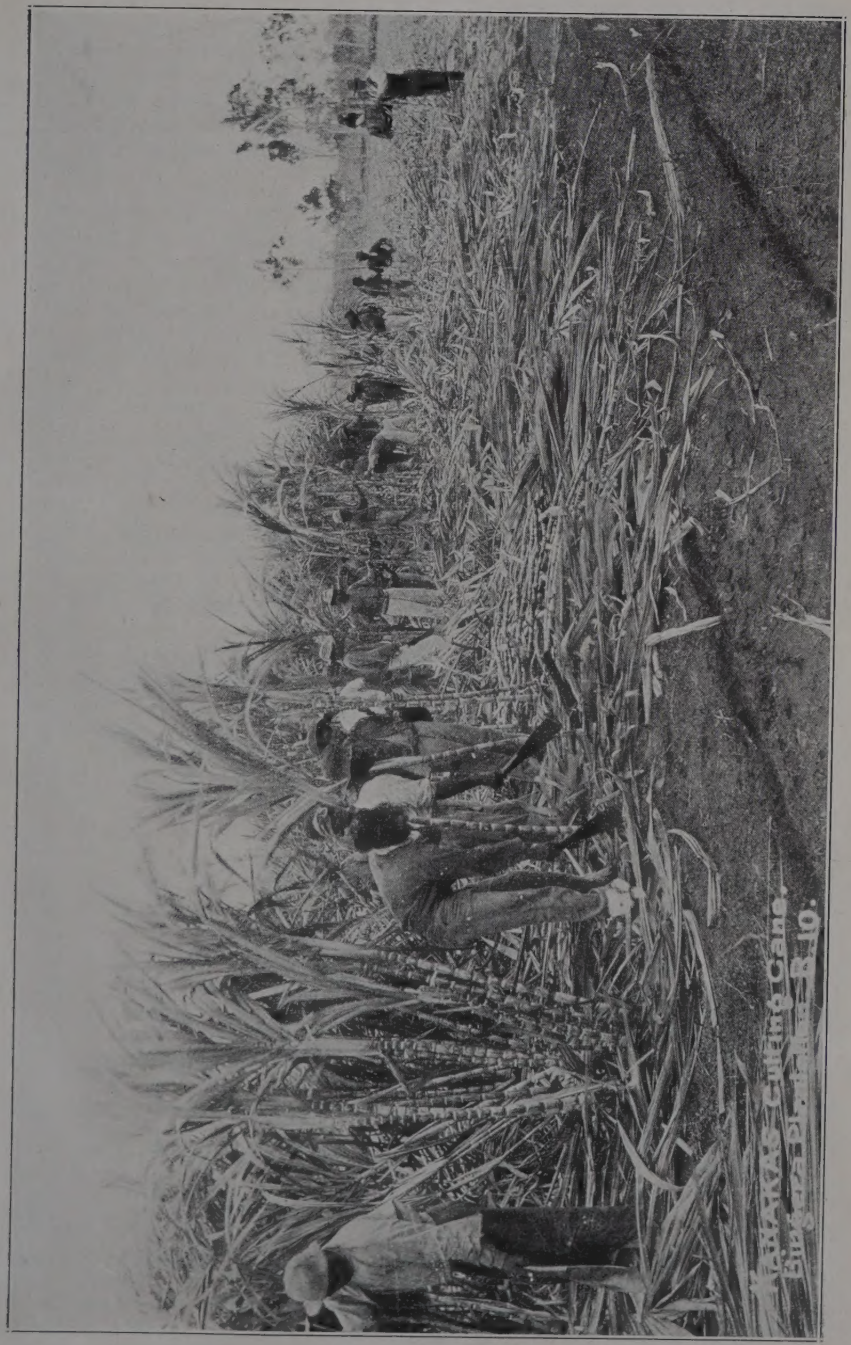


Plate 98.—Kanakas Cutting Cane at Bingera Prior to Federation.

ambitions in regard to intermarriage with the white race. That was the early kanaka; his more modern prototype was, very largely under the influence of 'civilisation,' a pronounced blackguard—truculent, addicted to gambling, and frequently to drink—until in some of our Northern coastal towns he was becoming so great a social menace that, the advent of the Federation under whose laws he was unceremoniously bundled off home was, if for no other reason, an undisguised blessing."

. . . . . .

"Locally, the importation of islanders into Queensland was governed under the 1868 law right up to 1880, when McIlwraith, having come into office for the first time, passed in the latter year a law which repealed the Act of 1868, re-enacted a number of its provisions with important alterations, and made the departure of appointing 'Government agents' to accompany each recruiting vessel to the islands. It may be said here that the Polynesian Labourers Act Amendment Bills introduced by Miles and Douglas in 1877 and 1878 respectively, had only reached their second reading stage, and in the meantime there had been continuous agitations either for repression or regulation of the traffic. In those years, Griffith, who afterwards took so prominent a part in the crusade against the trade and black labour employers, was a member of the Douglas Ministry as Attorney-General. Prior to the introduction of the above-mentioned Bills by Miles and Douglas there had been a Select Committee appointed by the Legislative Assembly in 1876 to inquire into 'the general question of Polynesian Labour.' In the light of the report of that Select Committee it is difficult indeed to give credence to much that has been said and written regarding this trade in black labour. After the examination of eighty-four agents' log-books the Committee concluded that 'the evidence has been singularly corroborative of the willingness of the islanders to come to the Colony, and of the absence of anything to warrant the assumption that they have been exchanged for trade, or otherwise improperly obtained,' and that while in Queensland their treatment had been 'humane and kind.' Before that Select Committee there was called as a witness a man who rightly or wrongly has been described as 'the Herald of White Australia.' William Brookes, at different periods a member of both the Legislative Assembly and Legislative Council, was a man who allowed his hatred of the trade to become a monomania. Practically he was the spokesman in Queensland of the Island Missionary interest, ever at war with the recruiter; and while no doubt he served a very useful purpose in constantly keeping in the limelight some of the more important abuses which admittedly attached to the business of recruiting, yet it is to be feared that he became somewhat bigoted on the subject, and was not able to take the more deliberate and judicial view of matters so necessary in the consideration of a question of State policy. He was an earnest and sincere man who allowed his extravagances of language to outrun his discretion, and no better example of that can be given than the language he used before the 1876 Committee when he said:—

> "If we were told that husbands were separated from wives, thousands of children left without their natural protectors, homes desolated, villages ransacked and burned; drunkenness, fraud, and every dishonest artifice employed in order to procure these men who were to add so immensely to our comfort—we heard all this as if it were an idle romancing tale told by sentimental philanthropists. So it came to pass that citizens who were

religious men, officers of churches, nay, even ministers of religion, saw no shame in availing themselves of the labour of poor, helpless savages who had been inveigled from their native homes, or in many, perhaps in most instances, who had been sold at the islands by their chiefs, and bought by white men, and bought and sold a second time at our whaves in Brisbane, Maryborough, Rockhampton, and Mackay."

"To use Brookes's own works, that indeed was 'idle romancing.' There were evils and to spare in the earlier days, but they had no official encouragement, and were suppressed with a stern hand in due time."

. . . . . .

"But a very much more important Act relating to Pacific Island labour was passed by Griffith in November, 1885. The eleventh and last section of this Act provided:—

> "After the thirty-first day of December, one thousand eight hundred and ninety, no license to introduce islanders shall be granted."

. . . . . .

"There was naturally bitter controversy over the proposed abolition, but it had been definitely agreed upon as a part of the State policy, and it was futile to try to resist the great political sweep of the country which Griffith had made at so recent a date.

"Who could have foretold, even with intimate knowledge of the great fighting qualities of the planter class, that this momentous decision would, within a few short years, be reversed? The importation of kanakas had to cease in December, 1890, but the islanders brought in up to that date would be on a three-years engagement, and thus eight full years were given in which those interested in the sugar industry could make arrangements for a suitable substitute.

. . . . . .

"The next move in the history of this troublesome question came in 1892. Two Governments, led by McIlwraith and Morehead respectively, had intervened between June, 1888, and August, 1890, at which latter date Griffith again came into power in combination with this one-time political foe McIlwraith. Many things had happened between those dates; many influences had been at work, and in April, 1892, Griffith came down to Parliament with and passed a proposal to repeal the provisions of the 1885 Act putting an end to the importation of Pacific Islanders.

"If one were asked to say how a man of Griffith's pronounced opinions, and whose political life's work had consisted largely of the advocacy of a white Queensland, committed a volte face of this description, it would be hard to give a true answer. When one looks back and thinks of how he attained the very pinnacle of his political fame largely by means of the high stand he took in his effort to prevent the good name of Queensland being besmirched by the dirty, sordid surroundings of a trade in black human skins, one wonders what malign influences were brought to bear to make so great a man recant such great ideals after spending the best years of his political life in cleansing an Augean stable.

PLATE 99.—KANAKAS IN THE FIELD AT BUNDABERG IN THE OLD DAYS.

"No wonder that between the years 1892 and 1901 Parliament preserved an ominous silence in regard to the question of Polynesian labour. In had hurt itself by its astounding inconsistency and want of continuity of purpose, and when the first Commonwealth Government came into power and passed in 1901 the Act which gave significance to the white kangaroo which subsequently appeared upon our postage stamps; when the island nigger was unceremoniously bundled out of Queensland, exemption being given to those who were exempted under section 11 of the Queensland Act, 47 Vic. No. 12, on the ground of continuous residence for not less than five years before the first day of September, 1884, there was no very profound regret that from Queensland at least had been removed for ever a fertile source of political contention and a not too beauteous adornment of our social structure."

Some forty-five years ago Cairns was, to all accounts, an exciting place to live in; live alligators were reported to often promenade the streets after nightfall, the pubs were lively, and even the kanakas afforded sport according to the old newspapers, for instance:—

> "A novel and exciting competition took place at Hambledon Plantation, Cairns, on a Sunday, for a wager of £30 a side. Twenty kanakas from Loridan's were opposed to the same number from Swallow's, for eight hours' work in the field. The match was won by Swallow's kanakas by 15 points, the cane being cut cleaner and neater than by their opponents. The local churches were empty owing to this counter attraction. I wonder on which side the parsons bet."

One very pious planter used to conduct a mission to his kanaka employees, and in his sermons combined moral precepts with an eye to the main chance. For instance, in inculcating the necessity of obedience to masters and of walking in the straight and narrow way, he would impress upon them that while working in the cane they should not be idle in the big cane because they were hidden. "Remember, boys," he would earnestly say, "God can see you in the big cane just as well as he can see you in the little cane; therefore, work hard wherever you may be."

In the reminiscences of Nehemiah Bartley, being memories of fifty years of Australia and Polynesia, the following reference is made to Kanaka Labour in Queensland:—

"Hundreds of men were easily persuaded to come to Queensland for a 3-year or 40-moon term, for 10s. a month, and a guaranteed stomachful all the year round; and as the enterprising agents who chartered the schooners could land men for about £3 a head, and as they charged £12 per head bonus to the settlers who engaged them, and, as the schooners could make several trips a year and carried over 100 niggers each time, you can imagine there was money in the business; for a settler or planter could well afford to pay a bonus of £12 in order to engage an islander secured for 3 years at £6 a year, in place of having to give a white man £40 a year to do sugar-cane cutting; the food being the same nearly in both cases as to cost, the black man's being more plentiful but coarser and cheaper. These islanders thus set a lot of white labour free to do other and less manual work. When their three years have expired and they get their wages, they buy muskets, powder and ball, so that when they get home to their islands again they may be able to resist the tyranny of their chiefs, who are

apt to make slaves of them if unarmed. It is strange to note the difference between them and our own Australian blacks. The latter are squalid and have no love of finery, but the South Sea Islanders, when their time is expired, become like the old by-gone dandy slaves in America, with pink silk ties, black silk hats, and a red hybiscus stuck either in the ear or the button-hole. These savages eat inordinately when they come to Queensland; some of them could eat a 3-lb. loaf and a shoulder of mutton, if procurable, at one meal. Thus they got into a gross habit of body and if they happen to catch cold, which is frequently the case in a change from an island to a continental climate, it takes a very heavy hold on them, and though the Government provide splendid hospitals for them and have strict regulations as to medical attendance, the islanders, unused to sickness and over-feeding at home, despair of life at once, and die in a ratio far exceeding the white man's mortality. Some of them at first are glad to get a lump of stale bread and a bowl of weak tea, but a little later on, if they have taken a position outside sugar-growing, they want nothing but new bread, fresh butter, eggs, and strong tea."

An interesting side-light on the behaviour of kanakas in Bundaberg in the 'eighties appears in the evidence of the Police Magistrate of that city when he was before the 1889 Commission on the Sugar Industry. He said "the 'boys' frequently got drunk on liquor supplied in shops kept by Chinamen, especially in some of the fruit shops. They got drunk there and frequently meet men of other tribes; then often there is a row."

He suggested that "special constables should be picked from the better classes of long-time kanaka boys. The kanakas chiefly come into town on Saturday nights; he had seen at least from 200 to 300. They generally congregated about a Chinaman's house at the lower end of Bourbong street. There is no doubt whatever that they are encouraged in gambling by the Chinamen, and that they do gamble. There appears to be growing amongst them rooted objections to putting their money into Government Savings Banks, and they actually leave it with these "pimps" at these shops and allow them to make use of it as they like. One man was taken into custody not long ago for robbing a kanaka of £20. The case broke down because the kanaka had told him, "You take money and you pay me back by-um-by"; and these kanakas prefer Chinamen because they suppose they will give them a better rate of interest. I knew one Chinaman who told me himself that "his wife had stolen a box from him containing £60 belonging to these black boys. It is terrible the large sums of money these Chinamen have sometimes in their hands."

The diseases the kanaka suffered chiefly from were in the chest, such as consumption, pneumonia, and pleurisy, and these diseases were the primary cause of death. Europeans on the other hand in the early days in the Northern cane field suffered from malaria fever which, however, diminished as years went by. One doctor said that much sickness amongst the kanakas in the early days was caused through imperfect clothing and indiscriminate bathing at all hours of the morning and night. Whenever the kanaka finished his work at night they threw their clothes off and spent the coldest part of the evening without clothes; then they drunk polluted water very often, which gave them dysentry and diarrhœa. They were also very subject to influenza.

The "boys" occasionally made complaint of ill treatment and sometimes these complaints were groundless, at other times they were justified. They were generally investigated by the Polynesian Inspector for the district who took action when he considered same necessary.

Giving evidence before the 1889 Royal Commission already referred to, the Polynesian Inspector at Mackay said that in February of that year there were about 2,155 kanakas in Mackay. The health of these was not bad. About a quarter of them went to the hospital every year and about 5 to 6 per cent. of them died mostly from fever. Five had been murdered since he had been in Mackay. The "hospitals" on the plantations for kanakas were not in charge of qualified persons and they had some rather rough "doctors." Of course, there were many cases where only a dose of oil was needed, but there were some dispensers he would not care to trust very much.

At Bundaberg the Polynesian Inspector said that in February, 1889, 2,600 kanakas were employed. He had not heard of many cases of ill-treatment. The general health of the "boys" was pretty good, but they were rather subject to pneumonia and tuberculosis. The mortality was from fifty to seventy per annum. There was a kanaka ward at the General Hospital, and any serious cases were sent in there from the plantations. On all the larger estates there were dispensers to administer medicines; on the small ones the employer did it himself. The dispensers were practical men, but they were not qualified. The kanaka, as a rule, was respectful, and he had never heard of any of them behaving improperly to ladies on the street. There were some kanaka haunts in Bundaberg where liquor was supplied and he would like to see these put down. After they had performed their three-years' agreement 50 per cent. returned to their homes, 25 per cent. go back to their original employer, and 25 per cent. go to other employers. A large proportion professed christianity and attended Sunday schools and had services there. There were three missions in Bundaberg to kanakas.

At one plantation in the North, belonging to a well-known company, the unfortunate kanakas were only allowed cold water and sweet potatoes for dinner. It is not surprising to find that the bulk of the kanaka patients in the district hospitals came from that plantation. The authorities investigated the matter and the kanakas were supplied with the proper quantities of bread, meat, potatoes, and boiled water.

"The Box" or "Bokus," as the kanaka called it, has been referred to before in this history. The following reference to one of these articles appeared recently:—

"The old red deal kanaka trade-box, so profitable to traders, was the cause of much interest on the part of custom officials responsible for only the correct trade being allowed to pass, rifles being strictly taboo. On one occasion when the boxes were being examined prior to being placed on the old-time labour schooners, used for both recruiting and deportation purposes, the box in question looked most innocent, the top layer of contents consisting of bibles. However, suspicion was aroused, and lack of depth caused a more careful examination, and a false bottom was found to contain a couple of rifles reposing therein. Another episode occurred when a rather stiff-walking and fully skirted "Mary" was prodded, and two rifles were located strapped to the inner sides of the lady's legs."

The dispensers at the "kanaka hospitals" on the plantations were often of a rough and ready type. I remember at one plantation I was on, the regular dispenser was absent for a day when his offsider, a good-meaning fellow, but very ignorant, was much exercised in his mind as to whether an enema should be used on a sick kanaka. He consulted me on the point by asking did I think he ought to give a "Hemu" to Jacky who seemed very sick. I declined to advise, so whether Jacky got his "Hemu" or not remained a mystery. When the town doctors used to come out to inspect the sick boys, those who were not in bed were lined up against a wall. Now, no matter what was wrong, nine out of ten of the boys would say "fever" when asked what was the matter. One doctor had a quick way of finding out if this was really so. He would stick his clinical thermometer in the first boy's mouth, read it, and shake the mercury down, wipe it on his handkerchief, and stick it into the next mouth, and so on. Those with a temperature were relegated to bed, those with none were given a hearty curse and sent to work.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following entomological hints for October, 1931, from Mr. Edmund Jarvis, Entomologist, Meringa:—

Object of Monthly Hints.

The publication of this series of entomological notes was first started about eight years ago (1923) with the object of inducing growers to keep a lookout for the occurrence during different months of the year of our primary insect pests of cane. I would again stress the advisability of more co-operation between farmer and entomologist. Concerted action taken at the right time might go far towards minimising injuries caused by such pests as the weevil-borer, army worms, grass-hoppers, &c., and would not interfere materially with daily farming activities. Now is the time to prepare for fighting those leaf-eating insects which may chance to appear later on during early summer months. Equipment for such work costs very little, consisting merely in a good spray-pump and a few chemicals for making poison baits or arsenical sprays.

Those growers intending to fumigate their cane against grub attacks should get into touch with the Secretary of the Cairns Cane Growers' Association, with a view to placing their orders for soil-fumigants as soon as possible.

The Value of Soil-Fumigants.

One hears much talk regarding the cost of fumigants and their being too expensive for use against cane grubs, &c. Such opinions, however, usually come from farmers who have not yet given them a trial, those who have done so being enthusiastic in their praise of this control method, which ensures them good plant and ratoon crops. Certainly, a grower who happens to suffer heavy losses each season cannot afford to disregard the merits of soil fumigation. Let us suppose, for instance, that he has a crop estimated to yield 25 tons per acre. Would he not be wise to sacrifice 5 of them in order to make certain of harvesting 20 tons? The 5 tons would fully pay for the expense of fumigating the acre, and not only ensure him a return of 20 tons, but also a crop of good ratoons for the following season.

On the other hand, by neglecting to fumigate he runs a risk of losing the entire 25 tons, and incurring the additional expense of replanting the acre, to say nothing about the cost of cane sets for planting this acre twice over and the loss of much valuable time.

Early Appearance of Grey-Backs in the Pupal Cells.

Existing conditions with regard to cane-beetle activities point to the possibility of an early emergence of grey-back cockchafers. One of these insects was ploughed up at Aloomba on 4th September, and additional specimens at Meringa three days later. These beetles were quite active, but would probably have remained two or three weeks longer in their pupal chambers before being ready to emerge normally and commence flying. During the years 1917 and 1918 grey-backs appeared on the wing on 20th and 25th October respectively, these being the only records of emergence for the last seventeen years. The specimens mentioned above as having already transformed to the adult or perfect condition were probably derived from eggs laid by the first emergence of beetles, which took place about the 8th December last. The grubs from these must have pupated towards the end of July; and in the event of the present dry conditions continuing throughout September and October, the beetles composing this early brood are likely to perish before being able to tunnel upwards to the surface.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from Mr. E. Jarvis, Meringa, the following entomological advice to canegrowers:—

THE ARMY-WORM OR CATERPILLAR PLAGUE.

Owing to favourable weather conditions during July and August caterpillars of the noctuid moth *Cirphis unipuncta* Haw. have already commenced to attack young ratoon shoots in parts of the Cairns district. Quite possibly this pest may cause more trouble than usual throughout the coming months of September to November, and growers would do well to make provision for combating future outbreaks. The moths of *unipuncta* often lay their eggs on low-lying grass land, from which after consuming all the food near at hand the young caterpillars migrate in search of new pastures. In outbreaks of this kind they usually travel in army formation, and when chancing to assemble near headlands are likely to invade canefields. On the other hand, moths when flying over plantations of young plant or ratoon cane will frequently lay their eggs directly on the shoots among the heart-leaves, areas so infected varying in size from about 1 square chain to an acre or more. The caterpillars of this moth when derived from eggs deposited on the cane feed at night time hiding during the day among the central leaves, their whereabouts, however, being invariably betrayed by numerous pellets or powdery fragments of excreta scattered over the heart-leaves or on the soil close to stems of affected plants.

When cane is severely damaged, while caterpillars are found to be half grown ($\frac{5}{8}$ inch long), the leaves should be sprayed with lead arsenate, using $1\frac{1}{2}$ to 2 lb. in 50 gallons of water. The pump used should be fitted with an agitator in order that the arsenical content may be held in suspension, thus ensuring an even distribution of the poison over all foliage sprayed. Arsenical dusts are being used largely at the present time for fighting all sorts of leaf-eating insects or larvæ, and it is hoped that opportunities will offer this season of demonstrating to growers the effect of such treatment on army worms and grass caterpillars. Control measures are seldom necessary in cases where the infestation happens to be very local or where only a few dozen plants appear to be attacked per square chain.

Should the caterpillars even in severe infestations chance to be about $1\frac{1}{4}$ inches in length control measures are not needed. These larvæ are attacked by many species of parasites, and also by a virulent disease known as "wilt" which often destroys 90 per cent. or more of the caterpillars.

Owing to the combined activities of such enemies, the second and succeeding broods of this moth pest are usually rendered harmless, on account of the proportionate increase of its parasitic foes.

GUMMING DISEASE RISKS.

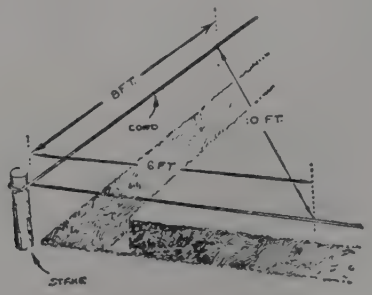
In response to a request from Bundaberg farmers, the Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from the Pathologist (Mr. A. F. Bell) the following report, 9th September, 1931, on the question of planting sugar-cane immediately following the ploughing in of a crop affected with gumming disease:—

The planting of a variety susceptible to gumming disease immediately following the ploughing in of a diseased crop is a practice which must be condemned outright. However much care a farmer might take in the operation of ploughing in, a certain number of diseased volunteer stools are almost certain to grow out from the remains of the stools of the old crop. In the ordinary course of events these would be destroyed in a subsequent ploughing, but in the case of an immediate replant they grow up amid the stools of the new crop. It is well known that gumming disease is readily spread through scratches in the leaves during wet weather, and that this is, in fact, the main mode of spread in the field. Consequently diseased volunteer stools will rapidly infect the surrounding cane as soon as suitable wet weather conditions occur, and the whole field will become infected, although only perfectly healthy setts may have been used in the new planting.

On the other hand, if planting is delayed until it is certain that all volunteer stools have been destroyed, there is then no danger of the new crop becoming infected through the soil. All attempts to transmit the disease through the soil have failed, and in this connection mention should be made of an experiment carried out on a field scale in the Bundaberg district this year by Mr. N. L. Kelly. In December, 1930, stools and stubble of cane which had died from gumming disease were taken to an isolated field and ploughed in. The field was inspected at intervals to ensure that no volunteer stools survived, and in February-March the field was planted with disease-free setts of highly susceptible varieties. The resultant crop is perfectly healthy, and no symptoms of gumming disease have ever been seen.

SQUARING A BUILDING.

In laying out buildings, foundations, &c., it is very important that they be properly squared before any work is done. A steel square is far too small to be reliable as guide in work of this kind. This method consists entirely of measurements. A stout stake is driven into the ground at the spot selected as the master corner. The direction of the master side is than determined. The other sides are then squared from this side. A strong cord is drawn across the master side and to stakes at the other corners which are temporarily set.



Measure 6 feet along the master cord from the point where the cords cross, and mark this point on the cord. Now measure 8 feet down along the cord at the side. Move this cord in or out as required until the distance between these two points is exactly 10 feet, as indicated in the sketch. The cords are then at exactly a 90-degree angle. The other stakes are then driven firmly into the ground and the cord drawn tight from one to another. The cord is then used as a guide for digging the foundation trench, setting concrete forms, or building stonemason work walls.—"New Zealand Farmer."

ECONOMIC ENTOMOLOGY.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

THE earliest existing literature contains interesting and significant references to insects and their association with man and the plants and animals required for his sustenance.

Such literature clearly indicates that the agricultural pest of outstanding importance to the early civilisations of Egypt and Assyria was undoubtedly the locust. Plagues of locusts and their devastating effect on early agriculture are a subject of lamentation by the prophet Joel. Furthermore, as B. P. Uvarov has pointed out, "the most ancient monuments of human civilisation, such as those of Assyria and Egypt, offer some definite beginnings of locust literature." L. O. Howard, in his recently published "History of Applied Entomology," records the opinion that "The shifting of the prehistoric civilisations of Central America may have been influenced largely by the occasional devastations of migratory grasshoppers." It is thus evident that man in ancient times was only too well aware of the influence exercised by insects in his struggle for existence on the fruits of a primitive agriculture.

When we turn our attention to the field of medical entomology we find that the influence of insect-borne diseases was even more profound—e.g., it is generally believed that the decay of the ancient Greek civilisation was due to the prevalence of malaria, an insect-borne disease introduced to Greece by hordes of invaders from Persia. Again, the course of civilisation in the Middle Ages must have been radically influenced by a still more deadly insect-transmitted disease—namely, bubonic plague, devastating epidemics of which swept across Europe in these times. Our ancestors were, of course, quite ignorant of the association between such diseases as yellow fever, bubonic plague, typhus, and malaria on the one hand and insect vectors such as mosquitoes, fleas and lice on the other.

The Position in Australia To-day.

When we turn our attention from the state of affairs existing in these early historic times to present-day conditions in Australia, we find that the position is both interesting and serious in so far as losses from insect activities are concerned.

On first settling Australia the white man inherited a continent which gave him not a single plant of importance that could be grown for his sustenance, nor did it yield a single animal that could be domesticated with profit. Hence everything required to make Australia habitable for our race had to be introduced. With these early introductions many serious pests of plants and animals were unfortunately brought to our shores. One can hardly blame the pioneers who were struggling for a footing in a new continent. They simply did not realise the extent of the added burden they were placing on the shoulders of future generations of farmers. Food in quantity had to be produced for the new communities, and seeds, living plants, and cuttings were introduced without adequate precautions and in quantities which would now be regarded as much too large for safety. One cannot help regretting, however, the magnificent opportunity that

* Text of a wireless address from Station 4QG.

was lost. If the rigid quarantine associated with modern administration had been operative from the commencement of settlement in our continent, we would have enjoyed, for many years at least, a wonderful degree of freedom from a large number of the serious pests that burden our competitors, and we would have gained a very material advantage in lessened costs of production. There would, however, have been no complete immunity from losses, because quite a number of Australian insects feeding on native plants prior to the advent of European civilisation turned their attention to introduced economic species.

With respect to Queensland itself, the position is intensified by a number of factors advantageous to insects in the struggle between man on the one hand and insects on the other for the available food supply. Firstly, we have a tropical and semi-tropical climate in which the winter check on insect life is not nearly so severe as that existing in practically every other country settled by the white race. Secondly, many of the areas under cultivation are very small in extent and are frequently isolated from each other by large stretches of scrub or uncultivated land which serve as breeding grounds for many injurious insects. Thirdly, Queensland is growing an extremely wide range of crops, starting with deciduous fruits produced in the Stanthorpe district at an elevation of almost 3,000 feet above sea level and ending with the most tropical products of North Queensland. A combination of these and other factors has resulted in Queensland being faced with a very large number of extremely serious problems. It is very difficult to form anything like an accurate estimate of the total loss in primary production due to insect activities in this State. There is, however, little doubt that it runs into several millions annually, this estimate including the losses inflicted by insect attacks on animals as well as on economic plants.

The Campaign Against Insects.

The magnitude of the problem having been indicated, it is now incumbent on me to refer to the measures that are being taken to alleviate the position.

Quarantine.

The first and one of the most important measures is the enforcement of rigid quarantine. This is essential because many very serious pests have not yet reached Australia, and every effort is now being made to prevent their doing so. The bad old conditions of practically uncontrolled mass importations of seeds, cuttings, and living plants and animals have happily long since passed away, and efficient quarantine has taken their place.

Most economic entomologists consider it desirable that, so far as practicable, no seeds, living plants, or cuttings should be introduced from overseas without good reason for doing so. Such introductions should be made only when there is evidence to support the belief that better varieties are available elsewhere and that such improved varieties are required for the continued prosperity of the branch of agriculture concerned.

When such introductions have been decided on as essential, it is furthermore generally considered desirable to restrict the importation to a relatively small quantity of seed, cuttings, or living plants of the required species or variety. The reason for this is that small quantities

can be grown in restricted areas under close supervision, so that any associated pests which may have passed the quarantine inspection can be adequately and promptly dealt with by extermination. This attitude of restriction of importation to small quantities is sometimes disappointing to growers, who are naturally impatient to plant up large areas of the improved varieties. It must be recognised, however, that the welfare of future generations of primary producers has to be taken into consideration, and any immediate gain achieved by mass importations might quite probably be obtained only at the cost of imposing on farmers the burden of the control of an additional pest.

Even when only limited introductions are made for planting purposes, rigid inspection is carried out and fumigation or sterilisation by other methods is a normal procedure. There is thus an assurance that everything practicable is being done to eliminate the risk inevitably associated with plant introductions.

Advisory Work.

Having indicated the precautions necessary to ensure that there will be no additions to our list of imported pests, attention can now be directed to those that are already present in the State. With respect to these, effective control measures are available in many cases and advice is regularly given to a large number of inquirers seeking information regarding control. Such advice leads to a saving of crops that would otherwise be partially or wholly destroyed with consequent heavy losses to the growers.

Research Work.

While much valuable information can undoubtedly be given with respect to the control of many of our pests, it must be admitted that there are still a large number of destructive insects for which control measures are only moderately efficient or in some cases totally inadequate. This is only what is to be expected in a young country faced with a multiplicity of problems, and it is the existence of these unsolved problems in control that justifies the numerous research projects at present under way in Queensland. That progress is being made in such research work is evidenced by the fact that in recent months the control of two very important fruit pests has been placed on a wholly satisfactory basis, whereas in previous years growers were not in a position to fight them at all effectively. It is considered that in one case the yield of fruit will be increased as much as thirty per cent., always provided, of course, that the control measures now recommended are applied by the growers.

Summary.

In these brief remarks I have endeavoured to demonstrate the importance of economic entomology, particularly in a semi-tropical climate such as that possessed by Queensland. I can assure you that the quarantine, advisory, and research work discussed as the main features of the campaign against destructive insects are sound business propositions, and it is pleasing to know that they are more and more being recognised as such by the community as a whole and that entomology is no longer regarded as a more or less harmless pastime indulged in by a few abnormal individuals. Economic entomology is now accepted in advanced communities as an integral part of any efficient organisation associated with primary production and health protection.

SOFT ROT (WATER BLISTER) OF PINEAPPLES.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

FOR some years past there has been reported from Southern markets a storage rot of pineapples known to the trade as water blister. This trouble is at times responsible for considerable loss both directly and in the depressing effect its presence has on the market. No disease known as water blister was recorded as occurring in Queensland, and it was eventually arranged that the Queensland Department of Agriculture and Stock should co-operate with the Council for Scientific and Industrial Research in investigating the problem. It was agreed that the plantation aspect of the problem should be handled by the plant pathological staff of the Department of Agriculture and Stock while the Council for Scientific and Industrial Research made itself responsible for the Sydney and Canberra work. An investigation in the Sydney markets soon led to the identification of the trouble as being the common soft rot of pineapples due to the fungous parasite *Thielaviopsis paradoxa*, a disease which had been known by plant pathologists in Queensland under names other than water blister for some years.

Since the discovery of the cause of the disease a considerable amount of work has been done in connection with finding a preventive and also in determining the origin and manner of dissemination of the causal organism in the field. This work has now reached a stage when many interesting facts may be placed before growers.

Description.

Soft rot is rarely seen on the plantation except on discarded fruit left undestroyed. In the early stages there is externally little evidence of damage other than a slight darkening accompanied by a water-soaked appearance of the surface. However, the skin will be found to be in a soft, brittle condition and may be easily pressed in with the finger. Internally there appears a semi-circular area of decay in a soft watery condition and somewhat darker than normal. This area extends out from the original point of infection, which is usually found to be the broken stalk end or other injury (Plate 100). As the disease progresses the affected region may develop a sooty grey colour owing to the production of enormous numbers of dark fungous spores within the tissue. Eventually the whole fruit is reduced to a soft watery rotting mass with the characteristic thin brittle outer shell. A disease appearing in the plantations which is sometimes confused with soft rot is that known as yeasty rot. This, however, may easily be distinguished by the following characteristics. The shell of a yeasty fruit is tough and leathery and of a dark brown colour. Internally the affected region exhibits a definite yellow colour and is in a dried shrunken condition. The core is last affected, whereas in soft rot this becomes rapidly soft and shreaded. Owing to the fermentation and loss of water taking place, the yeasty fruit is distinctly light in weight.

Another manifestation in which the fungus *Thielaviopsis paradoxa* appears to growers is as the causal agent of butt or base rot. This consists of the rotting of the butts of suckers and slips shortly after planting, the base of the planting material being reduced to a soft black

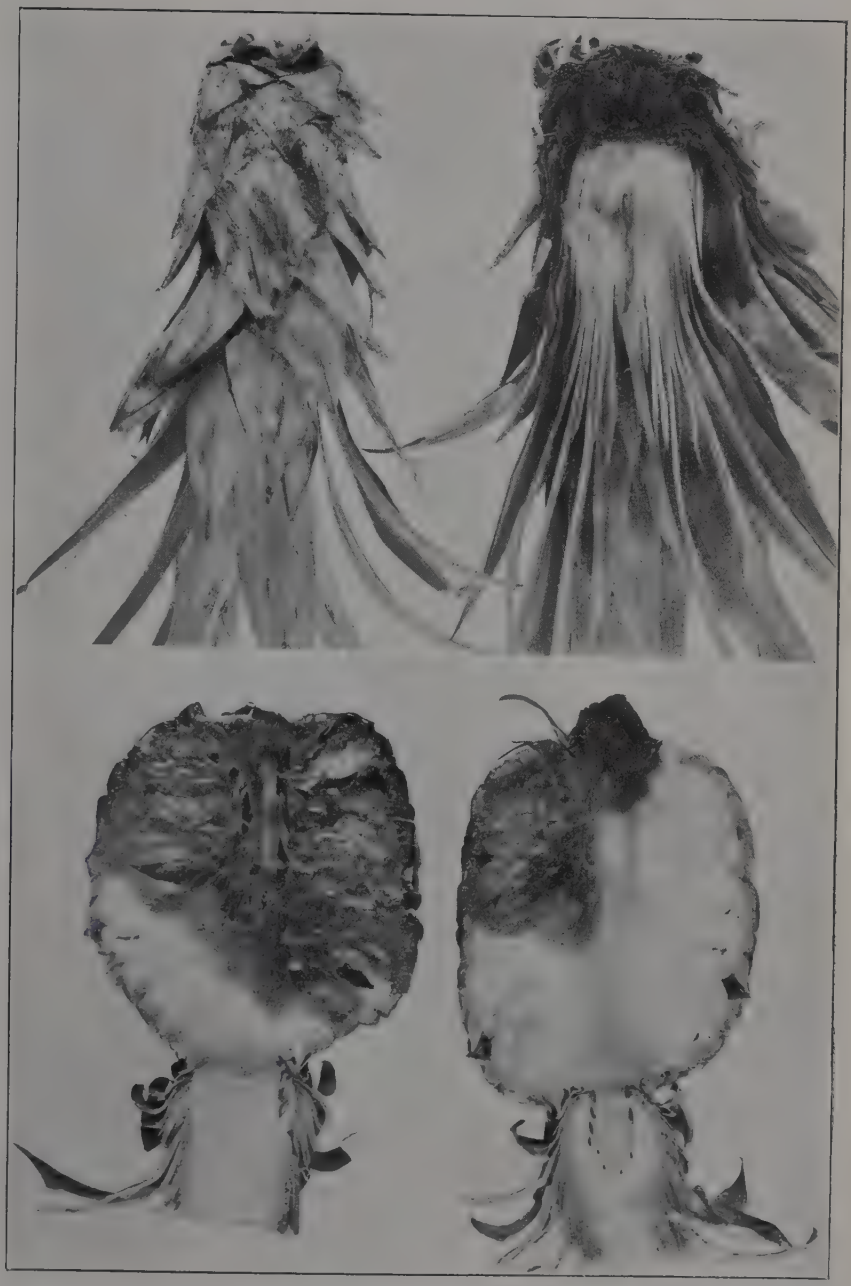


PLATE 100.

Upper figs.—Pineapple fruit affected with Soft Rot (Water Blister.)

Lower figs.—Infected pineapple top producing spores *Thielaviopsis paradoxa.*

shreaded condition (Plate 101). This trouble makes its appearance during warm, wet weather, more especially when the suckers have not been dried out prior to planting.

Important Points Bearing on Control.

Distribution.—Soft rot appears to be present throughout all the main pineapple-growing centres of Queensland. The disease is most prevalent during the warm and usually wet months of January to April, inclusive, when the main summer crop is being harvested. Experiments

Plate 101.—Base Rot of Pineapple Suckers.

with the temperature requirements of the fungus *T. paradoxa* show that its growth would be favoured by the warm summer weather, but would be retarded as cooler weather developed towards winter.

Point of Infection.—It was demonstrated after examining numbers of affected fruit in Sydney that in 75·5 per cent. of cases infection had taken place through the wound left by the breaking or cutting of the stalk. Various other surface injuries accounted for the other 24·5 per cent. affected. Observations in the plantation have shown that even

minute cracks in the fruitlet walls scarcely discernible to the naked eye are sufficient to allow the entrance of the fungus under favourable conditions.

Disinfectants.—For the past three years in conjunction with the Council for Scientific and Industrial Research attempts have been made to find a preparation which when applied to the fruit would prevent rotting taking place, the main attention being directed towards preventing infection through the stalk end. Fruit were treated in Queensland in many different ways and shipped to Sydney or Canberra, where they were examined for results. In all some 190 cases were treated in this way, the fruit being supplied through the courtesy of the Committee of Direction of Fruit Marketing.

It has now been shown that dipping the stalk in benzoic acid powder within five hours after cutting will prevent the development of soft rot through this point and thus reduce the amount of loss by 75 per cent. Boracic and salicylic acid were also found to be effective in this way, but their use is not desirable from the health point of view.

The best method of applying benzoic acid is as follows:—The fruit should preferably be cut from the plants with long stalks. The stalk is then cut a second time just prior to treatment, and the cut end is rubbed in benzoic acid powder, which can be conveniently placed in a saucer or some such vessel, and then packed. It has been found that the cost of treatment by this method is approximately twopence per case for materials. This cost may be considerably reduced if the benzoic acid is very carefully and intimately mixed with an inert substance such as kaolin. Fruit have been successfully treated by using a mixture of 1 part benzoic acid with as much as 4 parts of kaolin by weight.

Source of Infection.—Soft rot cannot develop without the presence of the spores of the causal fungus. The source of these spores is therefore important. Suckers, tops, leaves, and fruit left lying about the plantation and packing shed during the wet summer months are always liable to become infected with the causal organism of the disease, which produces in the tissue enormous numbers of dark-coloured spores (Plate 100). These spores become liberated into the soil and air and are blown to healthy fruit. Rot flies (Drosophilidæ) have been shown to be capable of carrying the disease from affected to healthy fruit, and rot beetles may also be a factor. That the fungous spores do exist in the air has been demonstrated in the following manner:—Small glass plates containing a culture material on which the Thielaviopsis fungus will grow have been exposed to the air for one or two minutes in sheds which were obviously not kept reasonably clean, and the fungus has later appeared growing on them. The organism has also been grown from the dust and earth on the floor of such packing sheds and from the soil in the plantation where suckers affected with butt rot have been taken out. So far the fungus has not been found in association with healthy living plants. The following example should force home in a striking manner the need for keeping the plantation and packing shed perfectly free from all pineapple refuse:—A grower obtained several thousand suckers for planting material, which were stored in a large shed. These, on account of wet weather, became badly affected with butt rot and were allowed to remain. The first picking of summer fruit were packed in another shed and harvested without loss. The next picking, being larger, was for convenience packed in the shed containing the heap of rotting

suckers. This consignment resulted in a total loss from soft rot. The fungus *T. paradoxa* was found by cultural methods to be present in abundance in the air and soil of the packing shed.

Control.

1. Practise strict sanitation in the plantation and the packing shed. All discarded suckers, tops, leaves, fruit, &c., should be gathered up and burnt or buried. This is perhaps the most important factor in the control of soft rot and may be the means of reducing the loss from this disease to an insignificant minimum.

If the packing shed has already become infected it should be thoroughly cleaned out and then sprayed with formalin solution of 5 to 10 per cent. strength.

2. All fruit should be carefully handled and packed to avoid bruising. Fruit damaged in any way should be discarded from long-distance consignment.

3. Fruit should be cut rather than broken off the stalk. It is an advantage to make a second cut just prior to packing with a knife which is wiped every now and then with a fungicide such as formalin or methylated spirits. This removes the spores which may have alighted on the previously exposed surface.

4. The cases and packing material must be free from contamination.

5. During the wetter summer months a preventive treatment of the fruit with benzoic acid may be advisable, although strict sanitary measures should obviate the need of this extra precaution in most cases. The following procedure is recommended:—Prior to packing, the cut end of the fruit stalk should be rubbed either in pure benzoic acid powder or in a mixture of benzoic acid and kaolin. The amount of kaolin should not exceed four times the weight of the benzoic acid, and should be very intimately mixed with it.

6. The form of Thielaviopsis injury affecting planting material and known as butt rot is usually effectively controlled by drying the plants well in the sun after trimming ready for planting. This may be conveniently done on a wooden or wire-netting tray raised off the ground.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

CABBAGE MOTH CONTROL BY NON-ARSENICAL SPRAYS.

By HUBERT JARVIS, Entomological Branch.

PROBABLY the most serious insect enemy that the cabbage-grower has to contend with in the Stanthorpe district is the cabbage moth (*Plutella maculipennis* Curt.).

This destructive little pest causes very serious damage to cabbages, and losses to the grower from this source have been exceptionally heavy during the last few years.

Although repeated treatments with arsenate of lead sprays and dusts have been generally resorted to, yet the control results obtained have been far from satisfactory, and it is evident that arsenate of lead, as generally recommended, is somewhat lacking in efficiency as a control for cabbage moth.

This is probably in some measure due to the impossibility of reaching every part of the cabbage with the spray or dust, and to its uselessness as a contact insecticide.

Doubling and even trebling the strength of the mixture has sometimes been resorted to, but this practice cannot be recommended as no better results are obtained, and, moreover, the excessive amount of arsenate of lead on the cabbages renders them dangerous to the consumer, more especially when cabbages are treated just prior to marketing, which is unfortunately often the case.

The experiments detailed in this report were carried out at Stanthorpe in the 1930-31 season with a view to obtaining a satisfactory control of this pest, with a spray of a non-poisonous composition, or one not likely to render the cabbage unfit for human consumption.

Experimental Plots.

The experimental plots were situated on high, level ground, and the drainage was all that could be desired. The nearest cabbages adjacent to the plots were about half a mile away. Each plot was approximately a quarter of an acre in area, and contained 816 plants, about three weeks planted, at the date of the first treatment.

One plot was treated with a proprietary spray known as katakilla, and the other with nicotine sulphate, soap, and arsenate of lead. Katakilla is a derris product. The spray mixtures were applied with a power-spraying outfit, having a pressure of 225 lb., driven by a gasoline engine rated at two-horse power. Katakilla was used at the strength recommended by the makers—i.e., 2 lb. to 40 gallons of water, and the nicotine sulphate at a strength of half a pint to 40 gallons of water, plus 2 lb. of soap and 1 lb. of arsenate of lead. Four treatments were given with each spray, every effort being made to thoroughly spray the plants, both on the upper and under surface of the leaves.

The quantities of material used at each spraying, the dates of application, and the cost of the materials are shown in Table I. Cost figures are based on the ruling local price of both katakilla and nicotine

sulphate, the former at 4s. per 2-lb. packet, and the latter at £2 18s. per 10-lb. tin. Soap is based on the local price of 5d. per lb., and arsenate of lead at 1s. 9d. per lb.

Seasonal Conditions and Insect Enemies.

Weather conditions throughout the growing period were unfavourable, being exceptionally dry and hot, and during November and December many cabbages wilted badly through lack of moisture. The moth at this time was especially active, as were also Rutherglen bug, *Oxycarenus* sp., and a small green jassid, the combined attack of these insects causing an additional setback to the plants. On the advent of rain, however, the plants were able to make good headway again, even some of those that had appeared almost worthless developing into marketable cabbages. Cabbage aphis was present in the plots, but caused little or no damage.

Mortality Tests.

In order to test the toxic value of the two sprays, a number of both the caterpillars and the cocoons were collected from each plot immediately after spraying and while still wet with the spray. These were kept under observation in breeding jars, and the results in Tables II. and III. show the superiority of katakilla as a contact spray; even the pupæ were killed within the cocoons. The cocoon is of course merely a light network of a very open structure, and it is evident that the spray was able to penetrate it. The number of pupæ killed by the nicotine and arsenate of lead spray was very small, being only 26·6 per cent., while 80 per cent. were destroyed by katakilla. The nicotine and arsenate of lead spray killed only 33·3 per cent. of the larvæ, whereas the larval mortality from katakilla was 87·5 per cent.

A number of the Rutherglen bugs were also collected from each plot, while wet with the spray, both adults and immature stages being represented. The results were very interesting, katakilla giving a 79·2 per cent. kill and the nicotine and arsenate of lead spray a 42·5 per cent. kill.

Seasonal Prevalence of the Moth.

All cabbage growers suffered serious loss during the season from the cabbage moth, everything being in favour of the pest, which was epidemic, and against normal cabbage growth. This is one of the pests which is consistently present in a greater or lesser degree each season, and although certain parasites are generally active, they apparently exercise only an inconsiderable degree of control.

White Oil Spray.

Although not thoroughly tested, it is worthy of mention that towards the end of the season about 400 cabbages were sprayed with a white oil preparation at a strength of one gallon of the oil to 80 of water, plus 2 lb. of arsenate of lead. At the time of spraying the cabbages were well hearted but badly attacked by the moth. The result of this spray was remarkable, the cabbages remaining cleaner than on either of the experimental plots. No dead larvæ could be found, and apparently the oil acted as a repellant. Damage to the cabbages ceased, nor were they later attacked. Experiments with this spray next season would certainly appear to be worth while.

Summary.

From the information tabulated it will be seen that both katakilla and the nicotine sulphate and arsenate of lead mixture used at the strength indicated gave a fairly satisfactory control of cabbage moth in an exceptionally bad season. The plants treated with katakilla were cleaner and better grown, and the toxic properties of this spray were superior to the nicotine sulphate and arsenate of lead spray.

The difference in price and quality of the cabbages from the respective plots was not recorded, but merely the number cut and marketed, and it will be realised that a cabbage may be marketable although of poor quality, but will not realise as good a price as a first quality cabbage.

The grower concerned was satisfied as to the superiority of the katakilla spray, it being repeatedly noted that practically every caterpillar hit by the spray perished, and this applied to even large noctuid caterpillars, a few of which were present on the plants.

Arsenate of lead, being only a stomach poison, appears to be the least satisfactory insecticide for cabbage moth control, and this, coupled with the danger to the consumer by its use in excessive quantities, is a strong argument for the use of non-arsenical sprays, which, in addition to a greater degree of efficiency, have the further recommendation of being safe from the point of view of the consumer.

TABLE I.

Time and Cost of Applications.

Date of Application.	Number of Plants Treated.	Material Used and Strength.	Quantity Used.	Quantity of Spray Fluid.	Cost.		Total Cost of Spray.	
				Gallons.	s.	d.	s.	d.
Plot No. 1.								
10th Dec., 1930 ..	816	Katakilla at 2lb. to 40 gallons	2 lb.	40	4	0	36	0
23rd Dec., 1930 ..	816		4 lb.	80	8	0		
10th Jan., 1931 ..	816		6 lb.	120	12	0		
9th Feb., 1931 ..	816		6 lb.	120	12	0		
Plot No. 2.								
11th Dec., 1930 ..	816	Nicotine sulphate at ½ pint to 40 gallons, soap 2 lb. to 40 gallons, arsenate of lead powder 1 lb. to 40 gallons	Nicotine, 10 oz.; soap, 2lb.; arsenate, 1 lb.	40	6	2½	45	0
23rd Dec., 1930 ..	816		Nicotine, 20 oz.; soap, 4 lb.; arsenate, 2 lb.	80	12	5		
13th Jan., 1931 ..	816		Nicotine, 30 oz.; soap, 6 lb.; arsenate, 3 lb.	120	18	7½		
10th Feb., 1931 ..	816		Nicotine, 30 oz.; soap, 6 lb.; arsenate, 3 lb.	120	18	7½		

TABLE II.

Mortality to Cabbage Moth Larvæ of Katakilla.

Date when Collected.	Number of Insects Collected.	Number Dead in 24 hours.	Per cent.
10th January, 1931	40	40	100
9th February, 1931	40	30	75
	80	70	87·5

Mortality to Cabbage Moth Larvæ of Nicotine, Soap, and Arsenate.

10th January, 1931	38	16	42
9th February, 1931	40	10	25
	78	26	33·3

Mortality to Rutherglen Bug of Katakilla.

10th January, 1931	50	46	92
9th February, 1931	46	30	65·2
	96	76	79·2

Mortality to Rutherglen Bug of Nicotine, Soap, and Arsenate.

10th January, 1931	80	36	45
9th February, 1931	40	15	37·5
	120	51	42·5

TABLE III.

Mortality of Cabbage Moth Puparia (Katakilla).

Date when Collected.	Number Collected.	Number Moths Emerged.	Number Died.	Per cent. Killed.
10th January, 1931	40	6	34	85
9th February, 1931	40	10	30	75
	80	16	64	80

Mortality of Cabbage Moth Puparia (Nicotine, Soap, and Arsenate).

10th January, 1931	30	24	6	20
9th February, 1931	30	20	10	33·3
	60	44	16	26·6

TABLE IV.

Percentage of Sound and Unsound Cabbages from Plots.

Plot Number.	Treatment.	Number of Plants.	Number Marketed.	Per cent.	Number Unsound.	Per cent.
1	Katakilla ..	816	604	74	212	26
2	Nicotine, soap, and arsenate of lead.	816	553	67·7	263	32·3

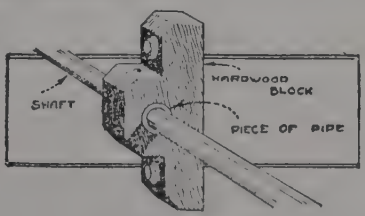
TABLE V.

Rainfall Table During Period of Experiment.

1930.				1931.					
November.		December.		January.		February.		March.	
Date.	Points.	Date.	Points.	Date.	Points.	Date.	Points.	Date.	Points.
1	3	6	1	9	36	1	162	4	2
4	15	8	28	10	57	4	33	6	48
6	4	14	2	19	59	5	97	10	6
7	29	15	10	26	10	6	30	12	3
10	22	17	89	29	3	8	4	13	6
16	23	22	10			28	2	15	5
19	8	26	39					16	5
22	43							22	32
24	2							23	19
								24	45
								25	14
								26	1
								28	1
Nov.	149	Dec.	179	Jan.	165	Feb.	328	Mar.	187

LINE SHAFT BEARING.

By means of a line shaft it is possible to drive a number of different machines or tools from one source of power. Many farms are now provided with electricity, and in this case an electric motor can be used to turn the line shaft. However, if electricity is not available, a gasoline engine will serve the purpose just as well.



In installing a line shaft, good solid bearings must be used. A good way to make these bearings is to take a hardwood block two inches thick, four inches wide, and twelve inches long, and cut it out in the shape shown. A hole is then bored through the block that is large enough for a piece of pipe that fits over the shaft to be used. A short piece of this pipe is then driven into this hole. The bearing is attached to the walls by means of two lag screws or bolts placed through the top and bottom of the block in the position shown. An oil hole is then drilled through the wood and the metal pipe from the top. The bearings must be attached to the studding of the building to make them rigid.

SOME NOTES ON THE BIOLOGY OF QUEENSLAND SHEEP BLOWFLIES.

By F. H. S. ROBERTS, M.Sc., Entomological Branch.

BLOWFLIES are generally regarded as species of flies which blow or lay their eggs on carrion, so, in the ordinary course of nature, acting as scavengers, and helping in this way to get rid of offensive materials in a rapid and efficient manner. Some of the species, however, have developed the habit of utilising live flesh for this purpose. In the case of short-haired animals, such as cattle and horses, blowfly attack occurs only when wounds and abrasions are present to attract them; but in sheep, on the other hand, the soiling of the thick wool is in itself sufficient to attract the flies and induce "blowing." Wounds, of course, also play their part in the inducement of strike, the infestation of the flesh-cracks and bruises on the head of the ram caused through fighting, and of the tail of the lamb after marking, furnishing good examples.

The conditions predisposing sheep to blowfly attack are as yet imperfectly understood, but it is fairly evident that, before "blowing" will occur, the wool attracting the flies must have a certain degree of moistness. The crutch and pizzle wool, where fly attack is usually most general, is made attractive to the flies through soiling with excreta and urine. Wool made moist from dew and rain, and even from the saliva of the sheep when it has been biting at some irritation, may also be struck.

The Species of Blowflies Concerned.

In Australia nine species of blowflies are recorded as attacking sheep, but only eight of these are to be found in Queensland, *Calliphora australis* Boisd. being confined to Western Australia. These sheep blowflies belong to the super-family Muscoidea. *Sarcophaga froggatti* Taylor is a member of the sub-family Sarcophagidæ, or flesh flies, the majority of which breed in carrion, though some species infest excreta, and one is a useful parasite of grasshoppers. The Sarcophagidæ may be readily recognised by their striped thorax and checkered abdomen. *Sarcophaga froggatti* was originally obtained from wool-infesting maggots at Winton, but, as there is only one record of its attacking sheep, the species is not regarded as of much importance. A second species of sheep blowfly to be found in Queensland is known as *Peronia rostrata* R.D. This is a shining, dark-blue fly belonging to the family Anthomyidæ. Flies of this family also breed in excreta and decaying vegetable matter. Little is known of the biology of *Peronia rostrata*, but it appears to have been bred only from sheep on which "blowing" was well advanced.

The remaining species belong to the sub-family Calliphorinæ, family Muscidæ, a family of flies of widely divergent habits, including, besides blowflies, such species as the house fly, stable fly, and buffalo fly. The Calliphorinæ are to be found breeding only in flesh, and do not utilise excreta, as is sometimes thought. The six species of this sub-family attacking sheep in Queensland are *Lucilia sericata* Meig., *Calliphora augur* Fabr., *Calliphora stygia* Fabr., *Chrysomyia rufifacies* Macq., *Chrysomyia micropogon* Bigot, and *Microcalliphora varipes* Macq.

Lucilia sericata Meig.—The fly known under this name in Australia is apparently identical with the English greenbottle, which is the

commonest sheep blowfly in the British Isles. It also occurs in other parts of the world where strike in sheep is known. Just how and when it was introduced into Australia is unknown. *Lucilia sericata* is a comparatively slender and bristly fly (Plate 102, fig. 4) about four-tenths of an inch in length. There is a fair amount of variation in size, which appears dependent upon the amount of food consumed by the larva or maggot. The colour is usually a bright metallic green, but varies to a certain extent, and at times may be almost uniformly bronzy, but it always shows a tinge of green and a characteristic metallic lustre.

Calliphora auger Fabr.—This is the smaller yellow blowfly which frequently comes into the house to "blow" meat. It may be easily recognised by the blue abdomen, deeply blotched on either side of the basal segments with yellow, so that the middle and apical portions of the abdomen are blue. The blue on the apical segments is somewhat obscured by a pale-yellow dust. The thorax is blue-grey, and the legs reddish-brown. This fly is a rather stout species measuring about one-third of an inch long.

Calliphora stygia Fabr.—This species is the larger yellow-bodied blowfly which, like *C. auger*, frequents houses, and attracts attention by its persistent buzzing and boisterous flight. The perfect fly is somewhat variable in size, but well-developed specimens may measure up to half an inch in length. The thorax is bluish-grey with a lighter under-surface, and the legs yellow. The abdomen is greenish-tinted, dusted with yellow, the whole of the upper surface clothed with short black hairs. The underside is covered with dense golden hairs, which with the yellow of the abdomen give the fly a distinctly golden appearance. At least eight distinct species—all very similar in appearance to *C. stygia*—have been recognised, of which the Western Australian *C. australis* is one. The relation of each of these species to strike in sheep has not yet been determined.

Chrysomyia rufifacies Macq.—This species is a comparatively robust fly (Plate 102, fig. 8), measuring about one-third of an inch in length. The colour is of a uniform metallic blue, sometimes with a tinge of green, and sometimes bronzy like the greenbottle. The colour is deeper on the edges of the abdominal segments to give the fly a distinctly banded appearance. If examined closely, very few bristles will be detected. *C. rufifacies* at times bears a strong resemblance to *Lucilia sericata*, but may be readily recognised by its more robust appearance, prevailing bluish colour, the presence of the narrow bands across the abdomen, and the comparative lack of bristles. Both of these species may at times be confused with the greenish fly (*Pseudopyrellia* sp.) so frequently seen in large numbers around fresh cow dung. This species is not a blowfly, and its green colour soon turns to a bright blue-violet after death, while the colours of the two blowflies remain constant.

Chrysomyia micropogon Bigot.—In size *C. micropogon* approaches that of the smaller house blowfly *C. auger*. It may be readily recognised by its large reddish-brown eyes, yellow face, uniform metallic dark blue colour, and black legs.

Microcalliphora varipes Macq.—This is the smallest species of the blowflies infesting sheep, being about half the size of the housefly and somewhat more robust, due to its comparatively large head. Its colour is bright metallic green, with a pale-yellow face and mottled legs.

PLATE 102.—SHEEP MAGGOT FLIES.
(*For description of Plate see page* 407.)

Life History Notes.

There seems to be no distinct strain of flies that attack sheep, for such flies that attack sheep will readily lay their eggs on meat, and, on the other hand, flies that have been reared from meat will oviposit on the wool of sheep. The period of development of the eggs and larvæ on the sheep is much the same as that in meat, and such of the life histories of Queensland sheep blowflies as are known have been obtained by rearing the larvæ in meat.

The life histories of the several species are very similar, differing only in detail. It is, therefore, proposed to deal thoroughly with the life history of only one species—*Lucilia sericata*—mentioning that of the others by way of comparison. The greenbottle has been chosen as it is probably the most important sheep blowfly and has received a good deal of attention from various workers.

The Egg.

The female fly lays her eggs in some sheltered spot in the meat or in the wool. As many as 250 eggs (which are heaped together in a sticky mass) may be laid at any one time. A single female, during her lifetime, may lay 1,000 eggs or more. The newly-laid egg (Plate 102, fig. 1.) is white in colour, and somewhat sausage-shaped. In some of the species—*Calliphora auger* and *Calliphora stygia*—the egg, at times, is retained in the body of the female until it hatches, and is then deposited as a tiny maggot. In summer time the eggs may hatch within sixteen hours, but in midwinter may take as long as three days, or even more in a very cold climate.

The Larva.

From the egg comes the tiny, legless maggot of the fly. The maggot (Plate 102, fig. 2) is of an elongate conical shape, pointed at the anterior end and divided into a number of segments. The maggots of the majority of blowflies are smooth in appearance and whitish in colour, but those of *Chrysomyia rufifacies* (Plate 102, fig. 6) and *Microcalliphora varipes* are brown and so covered with erect tubercles as to give them a hairy appearance. In feeding, a slimy fluid is emitted from the mouth. This fluid has a streng digestive action and liquefies the meat, so making it available to the maggot. The wet and soiled appearance of infested wool is also due to this digestive fluid, which rots the wool fibres. They feed in squirming masses with the pointed head end immersed in the liquefied meat and their blunt hind ends raised above its surface. At this end there is a pair of openings,

SHEEP MAGGOT FLY.

Description of Plate 102, *page* 406.

Lucilia sericata Meig.

Fig. 1 .. .. Egg x 23.
Fig. 2 .. .. Larva x 7.
Fig. 3 .. .. Puparium x 7.
Fig. 4 .. .. Adult x 7.

Chrysomyia rufifacies Macq.

Fig. 5 .. .. Egg x 23.
Fig. 6 .. .. Larva x 7.
Fig. 7 .. .. Puparium x 7.
Fig. 8 .. .. Adult x 7.

known as spiracles, through which the maggots breathe. The necessity of keeping these spiracles clear of the liquid is evident, else the maggots would perish.

In the warmer months the maggots feed rapidly, and are fully fed in four days. In the winter time they feed much more slowly, and may not be fully fed for seven days or more.

The Prepupa and Pupa.

When fully fed, the maggot crawls away from the meat or drops from the sheep, burrowing into the earth to seek protection from birds and parasites. Here it lies motionless for about two days in summer or for twenty-two days or more in winter, preparing for the commencement of the great change in its life from which it will emerge as the adult fly. This quiescent period is known as the prepupal or larval resting period. Gradually the maggot shrinks and its outer skin becomes hardened and turns brown. Inside this hard brown coat or puparium (Plate 102, fig. 3) the whole of the larval tissues break down into a creamy mass, from which the adult structures—the body, legs, and wings—are rebuilt. This is the pupal stage, and may last only six days in summer or as long as seventeen days or more in winter.

Duration of Life Cycle.

From the foregoing it will be seen that in summer time the life cycle of *Lucilia sericata* may be completed in thirteen days and in winter in forty-nine days or more. For *Chrysomyia rufifacies* and *Microcalliphora varipes* the respective periods are nine and thirty-six days, and *Calliphora augur* seventeen and thirty-three days. The life-cycle periods of the remaining species are incomplete, but summer conditions are said to induce the emergence of the adult *Sarcophaga froggatti* in twenty-two days, and of *Chrysomyia micropogon* in twelve days. In the spring *Calliphora stygia* takes about thirty days for its life cycle, and *Peronia rostrata* twenty-six to forty-three days.

The life-cycle periods given above were obtained in Brisbane. It is probable that the western climate of Queensland would be conducive of a good deal of variation in the respective periods, especially in the winter, when the life cycle may extend over a period of several months.

The Adult.

The imprisoned fly, when ready to emerge from the pupa, is able, by means of a pulsating bladder-like organ on the front of its head, to push off the end of the puparium or hard pupal case and work its way to the surface of the soil. *Lucilia sericata* has been known to make its way in this manner through 4 feet of loose soil to the surface.

On emerging, the fly is very soft and drab in colour. It makes its way to some sunny spot where it spreads its wings and raises them up and down to facilitate drying. After a while the bladder is withdrawn into the head, the body and wings dry, the colours of the body become evident, and the insect (Plate 102, fig. 4) is ready to fly off and commence its adult life.

Little has been published of the biology of the adult flies, but certain data concerning their range of flight and longevity is available.

It has been shown that the range of flight of the blowfly *Chrysomyia rufifacies* is at least 10 miles, which can be traversed in about twelve days. This means that flies breeding in a carcase may be distributed over a tract of country 20 miles in diameter—an area of 314 square

miles. The flight of the flies is usually with or slightly across the wind, but carrion may be followed against a slight breeze.

The length of life of the adult or fly stage of *Chrysomyia rufifacies* in the field has been determined as at least twenty-eight days. In South Africa a sheep blowfly (*Chrysomyia chloropyga*) is recorded as living eighty-two days; so the longevity of the Australian species is probably much longer than that recorded.

Blowflies appear most susceptible to hot, dry conditions. Moisture is essential for larval development, and under dry conditions the larvæ and adults rapidly succumb. During the heat of summer or during a prolonged drought blowflies are scarce and the sheep are not attacked, but, given mild, showery weather, the flies increase very rapidly and strike among sheep is frequent. In Queensland strike appears more prevalent in the late summer and autumn and in the spring and early summer, being consequent on the mild conditions and seasonal rains. If the winter is mild and wet, infestation may be continuous, disappearing only as the heat of the summer becomes intolerable to the flies.

Why Strike in Sheep Occurs.

Various theories have been advanced at different times to explain blowfly infestation of sheep. It has been suggested that in the prolonged droughts of past years the blowflies bred up in enormous numbers in the carcases of sheep, and from laying their eggs on the wool of these carcases gradually acquired the habit of ovipositing on the wool of live sheep. The large-scale destruction of rabbits in the States overrun with these pests has also been blamed for breeding immense numbers of flies. The breeding of sheep heavily wrinkled in the breech and thereby increasing the possible attractiveness of body secretions has been demonstrated to be one of the causes of strike.

Modern research supports the opinion that myiasis in sheep—i.e., the attack of any living animal by fly larvæ—may be traced in Australia to the introduction and subsequent spread of the English greenbottle (*Lucilia sericata*). In the first place, myiasis of sheep is known also in the British Isles, parts of Europe, North America, South Africa, and New Zealand, and in each and every one of these countries *Lucilia sericata* is present and is known to "blow" sheep; secondly, from numerous samples of freshly "blown" wool *Lucilia* only has been bred; and thirdly, this fly occupies a position in regard to carrion which is probably analogous to that held in regard to sheep. It has been shown that the greenbottle is the first blowfly to arrive and lay its eggs after the death of any animal, and it will oviposit only whilst the flesh is comparatively fresh. Its larvæ create suitable conditions in the flesh for the attraction and oviposition of the other species—chiefly the *Chrysomyias;* and without previous blowing by *Lucilia* the *Chrysomyias* will not lay their eggs on carrion. It would seem, therefore, that *Chrysomyia rufifacies*, which, on account of the voracious habits of its maggots, has always been generally regarded as one of the worst sheep blowflies, will only attack a sheep previously "blown" by *Lucilia*. The position of *Calliphora auger* and *Calliphora stygia* is not yet satisfactorily defined, but as *Calliphora auger*, at least, is known as a primary "blower" of carrion, it may also act similarly with sheep. *Lucilia sericata* is, however, regarded as of the major importance, and it has been said that in its absence the frequency of strike would be considerably reduced.

A NOTE ON THE OCCURRENCE OF SARCOPTIC MANGE AMONG PIGS IN QUEENSLAND.

By F. H. S. ROBERTS, M.Sc., Entomological Branch.

SARCOPTIC mange has no doubt existed among pigs in this State for many years, but, so far as the writer is aware, no actual record has previously been published on the isolation and identification of the mite concerned.

In June last, scrapings of mange crusts from a pig at Murgon were submitted for examination by Mr. L. A. Downey, H.D.A., the Instructor in Pig Raising. *Sarcoptes scabiei* var. *suis* was shown to be the cause of the disease.

Some two months later attention was drawn by Mr. E. J. Shelton, H.D.A., the Senior Instructor in Pig Raising, to a Tamworth boar suffering from a severe type of skin trouble. Scrapings showed the presence of numerous Sarcoptic mange mites. The disease was in a very advanced stage, practically the whole skin area showing evidence of mite attack. The parasites were most active on the abdomen and throat, whilst on the back, shoulders, hams, and flanks the mites were comparatively scarce, the dry scurfy condition of these areas denoting "dry mange." The intense irritation had been followed by loss of condition and the formation of raw and bleeding areas through constant scratching and rubbing. The scabs in the skin folds had been broken by the movements of the animal and blood and serum had oozed out from the cracked surfaces.

Determination of mite mange is made, as mentioned above, from skin scrapings. As the mites burrow fairly deeply into the skin, the scrapings should be made deep enough to cause the appearance of blood.

Crude petroleum or fuel oil at a cost of 1s. per gallon is one of the most effective remedies. The affected animal should be well washed with soap and water and allowed to dry before the oil is applied, and should be kept in the shade until the oil has disappeared, usually about three days.

As many of the eggs may not be killed by the oil, a second application is necessary four days later, in order to destroy the ensuing mites before they reach maturity.

SALT FOR PIGS.

Visiting a well-known stud piggery in the metropolitan area of Brisbane recently, it was noticed that the man in charge of the pigs kept a bag of coarse salt (usually known as pickling salt) close to the feed boiler. When asked if he used salt in the food the man replied that he regularly added a handful of salt to the food when preparing same for cooking, for he had noted over a series of years that the pigs always made better growth and had better appetites when a little salt was added to their food.

The quantities used would, of course, be important, and should not exceed, say, one-half teaspoonful per pig per day, but it has a good food value, and is a necessity in all rations. Care must be taken not to force the pigs to consume too much salt, and the water in which corned beef or ham has been boiled should not be used as pig food, unless distributed over a large quantity of food.

Salt is a necessity, so also is charcoal, wood-ashes, and bone-meal. A cup full of lime water added to the pig's food occasionally will also be productive of good results.

The careful farmer watches all these points and sees to it that his pigs do not suffer as a result of a deficiency of mineral matters.

SUBSOILING OF MR. W. JACKSON'S FARM AT NORTH ETON, MACKAY.

Mr. W. Jackson, of North Eton, Mackay, who is known to all Mackay sugar-growers as a thoroughly up-to-date cane farmer, has recently introduced subsoiling on his farm, which, incidentally, is one of the best in the Mackay district. The photograph appearing below will give some idea of the work carried out.

For many years past Mr. Jackson has been a firm believer in the use of sugar-mill refuse, such as filter press cake, wood ash, and molasses, and it may be said that he has obtained very fine results. He was one of the pioneers in the Mackay district in the use of molasses as a fertilizer, and a visit to his farm is well worth while.

Plate 103.

Plate 104.

CLIMATOLOGICAL TABLE—AUGUST, 1931.

Compiled from Telegraphic Reports.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·02	81	68	85	15, 16	59	12	66	6
Herberton	..	72	52	83	31	39	11	61	7
Rockhampton	30·11	79	55	84	12, 22	42	1	20	5
Brisbane	30·14	72	51	80	7	44	1	90	7
Darling Downs.									
Dalby	30·13	72	43	79	21	28	1	27	3
Stanthorpe	..	63	37	72	12	22	24, 1	72	9
Toowoomba	..	64	43	72	7, 12, 21	30	24	38	6
Mid-Interior.									
Georgetown	30·00	87	57	91	31	42	24	0	..
Longreach	30·08	81	48	88	6	37	24	0	..
Mitchell	30·14	72	39	82	14, 21	27	23, 24 25	13	1
Western.									
Burketown	30·02	84	59	91	18	45	25	0	..
Boulia	30·09	80	48	92	5	39	25, 26	0	..
Thargomindah	30·13	69	42	84	27	37	24, 25 29, 9	2	1

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August, in the Agricultural Districts, together with Total Rainfall during 1931 and 1930 for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.,	No. of Years' Records.	Aug., 1931.	Aug., 1930.		Aug.,	No. of Years' Records.	Aug., 1931.	Aug., 1930.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·80	30	0·77	0·05	Kilkivan	1·49	52	0·39	3·00
Cairns	1·70	49	1·15	0·97	Maryborough	1·69	59	2·87	3·43
Cardwell	1·26	59	0·52	0·20	Nambour	1·87	35	1·65	2·15
Cooktown	1·26	55	0·66	0·14	Nanango	1·35	49	0·49	1·19
Herberton	0·62	44	0·61	0·05	Rockhampton	0·97	44	0·20	1·41
Ingham	1·45	39	0·23	0·18	Woodford	1·74	44	1·67	1·77
Innisfail	4·97	50	2·57	1·93					
Mossman Mill	1·21	18	1·10	0·89					
Townsville	0·51	60	0·10	0·05	*Darling Downs.*				
Central Coast.					Dalby	1·23	61	0·27	2·50
					Emu Vale	1·17	35	0·05	1·36
Ayr	0·58	44	0	0·11	Jimbour	1·20	43	0·30	1·38
Bowen	0·66	60	0·11	0	Miles	1·16	46	0·06	1·54
Charters Towers	0·56	49	0·01	0	Stanthorpe	1·82	58	0·72	2·49
Mackay	1·06	60	0·18	0·89	Toowoomba	1·69	59	0·38	1·73
Proserpine	1·33	28	0·22	0·30	Warwick	1·51	66	0·23	1·13
St. Lawrence	0·84	60	0·32	0·13					
					Maranoa.				
South Coast.					Roma	0·95	57	0·02	0·81
Biggenden	1·11	32	0·18	1·87					
Bundaberg	1·31	48	0·90	2·64					
Brisbane	2·03	80	0·90	1·76	*State Farms, &c.*				
Caboolture	1·57	44	1·02	2·59					
Childers	1·24	36	0·94	2·28	Bungeworgorai	0·83	17	0	0·53
Crohamhurst	2·21	38	2·95	2·96	Gatton College	1·05	36	0·46	0·92
Esk	1·54	44	0·66	1·65	Gindie	0·67	32	0·51	0
Gayndah	1·18	60	0·23	1·79	Hermitage	1·31	25	0·15	1·63
Gympie	1·75	61	0·62	1·93	Kairi	0·84	17	..	0
					Mackay Sugar Experiment Station	0·92	34	0·04	0·60

J. H. HARTSHORN, Acting Divisional Meteorologist.

HARVESTING AND PACKING LEMONS FOR MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

SIZE is an important factor in lemon-marketing, large over-grown fruit not being popular with the retailers. A good commercial size is a lemon 2½ to 2⅝ inches in diameter. Coarse, over-developed lemons are often produced when they are allowed to ripen on the tree. Lemons are best harvested just as they begin to change colour. Fruit picked at this stage will also cure to perfection, and, when modern artificial colouring methods are used, a first-grade, well-coloured fruit is obtained. Handled carefully, fruit properly cured, whether coloured or not, will keep for many weeks. Care in handling should be shown through all stages from the picking to the marketing.

Harvesting.

Lemons picked to be stored and cured or transported over long distances should be carefully clipped. It is best to make two clips—one to remove the fruit from the tree, and a second to remove, if any, the surplus stalk. Gloves should be worn whilst handling, to avoid fingernail damage. The best type of clipper is the parrot-nosed type. Picking bags, if used, should be used with great care, as they are often a source of great damage to fruit when carelessly handled, causing stalk rubs, with the added chance of mould infection. It will be found that baskets, or kerosene tins cut lengthwise and provided with a handle, are most satisfactory for harvesting. Fruit should never be tipped or rolled into the harvesting boxes.

Curing.

After harvesting, the lemons should be taken immediately into the sheds to avoid any chance of becoming heated, and there sorted carefully into clean and dirty fruit. The clean fruit should be placed in trays or open-sided boxes made on the flat, and then stacked in a cool place. Dirty fruit should be washed carefully and wiped and spread out in a draught to dry thoroughly. After drying, it should be placed in trays or boxes, and stacked with the other clean fruit and allowed to sweat. Care must be taken that the trays or boxes are stacked to permit a free circulation of air through and around the fruit. After being sweated thoroughly, which usually takes from a week to fourteen days, the fruit should be sized carefully and wrapped for market. Lemons can be kept for a great length of time when these operations are carried out carefully, but it must be remembered that they will lose considerably in size when kept for lengthy periods; and when packed and stored for any time it is necessary to repack to remove any possible wasty fruit, and to tighten up the slackness of the pack through shrinkage. It is always necessary to see that all gear used in the handling of lemons is kept clean. Frequent sprayings with formalin solution (1 to 20)—one part of formalin to twenty parts of water—will be of great help in controlling mould infection from containers, or machinery infected with mould from waste fruit.

ARTIFICIAL COLOURING.

A modern method of artificial colouring is the ethelyne gas treatment. The fruit is placed in a gas-tight chamber, and the gas, which is procured in cylinders, with gauges for measuring attached, is injected into the chamber, the quantity being 1 cubic foot of gas to each 1,000 cubic feet of space in the room. For best results during colouring, an even temperature of about 65 degrees Fahrenheit should be maintained.

Fruit should be spread out on trays and stacked in the chamber so that the gas has free access to the fruit, battens being placed on the floor to stand the bottom layer of fruit upon. Trays to hold a single or double layer of fruit are excellent, but expensive. Growers may use cases if necessary. Cases should be made open at the side, with the boards spaced apart. It is recommended that the same cases be used always for the process, as they can then be kept clean and free from fungus infection. Spraying the chamber and cases occasionally with a 1 in 20 solution of formalin will assist in eliminating infection from moulds. In applying the gas, nothing is gained by using a larger quantity than necessary. After the necessary quantity of gas has been applied at the correct temperature, shut off the gas and allow the room to remain closed for at least four hours. Then open the chamber and ventilate the fruit completely to renew the oxygen. This needs to be done as completely and quickly as possible to keep the temperature of the fruit from changing in any marked degree. It is of advantage to allow the fruit to stand without gas for one to two hours before recharging the chamber. Two applications of gas a day are sufficient, but an extra application will assist in having the fruit coloured ready for market sooner. The same method is used for

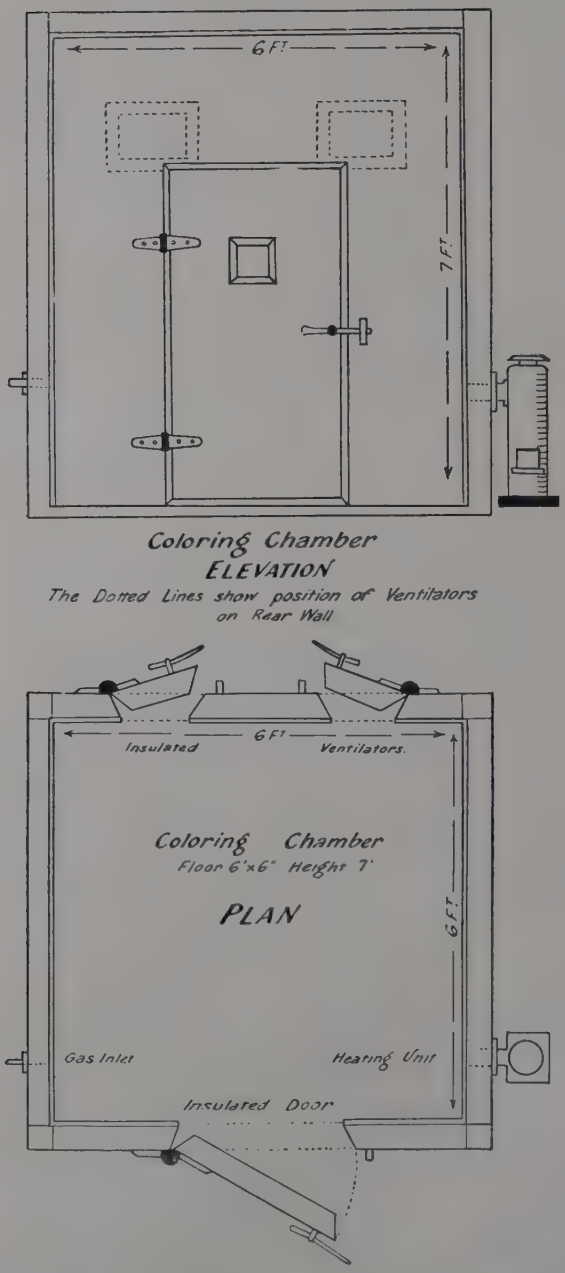


PLATE 105 (Fig. 1).—PLAN AND ELEVATION FOR COLOURING CHAMBER.

Note.—The placing of the door with its inspection window and ventilators, which should be made as gas tight as possible. Provision is also made for artificial heat and the application of the gas.

each application, nothing being gained by recharging sooner than four hours after the previous application of the gas. Lemons properly cured and coloured by this process have a greatly enhanced appearance, and will keep for many weeks when stored in a cool, dry place. It is advisable to use care in colouring if oil sprays have been used on the trees, as the skin of the fruit is inclined to burn through chemical reaction.

When using the ethelyne gas treatment, the following points should be observed closely:—

Have a temperature of 65 degrees approximately in the gas chamber.

Have fruit packed loosely in boxes of trays.

Apply gas in the quantity necessary according to the size of the room, at 1 cubic foot of gas to each 1,000 cubic feet of space.

Allow the room to remain closed for at least four hours.

Open and ventilate the fruit fully to renew oxygen.

Repeat the same process for further applications.

Remember that nothing is gained by overcharging or charging the chamber too often, and it is costly.

Care should be taken to keep all naked lights away from the room or cylinder when using the gas, as the mixture becomes dangerous when a large quantity of gas is mixed with air.

BUILDING THE GAS CHAMBER.

The building may be constructed of suitable timber, insulated and lined, or built of iron, which is hard, however, to make gas-tight. The process is done quicker and more efficiently with less waste if the chamber is made gas-tight. To make a gas-tight chamber, which means a large saving in the quantity of gas used, the space between the outside wall and the lining boards should be insulated by filling with sawdust, wood shavings, charcoal, or other suitable material. This is also a big factor in maintaining an even temperature. Paper-lining in addition to the filling is an additional improvement. In filling the cavity between the outside wall and lining boards, trouble can be avoided by building the wall and lining at the same time, and placing the filling in position as the wall is erected. As a sufficient supply of oxygen must be maintained in the room, it is necessary to change the air after every application of gas. To do this successfully, ventilators should be placed at the opposite end of the room to the door. The door and ventilators (See Fig. 1) should be made as close-fitting as possible, and insulated in the same manner as the walls to obtain best results. By placing the ventilators at the opposite end to the door, the air can be quickly changed in the room by opening both at the same time, without causing any undue variation in temperature.

Temperature Control.

Heating to obtain the correct average temperature of 65 degrees Fahrenheit may be necessary in some climates, so provision should be made when building the gas chamber for the erection, where necessary, of a heating system. By building the room in a corner of the packing shed a more even temperature may be maintained, and in many parts of Queensland should make it unnecessary to instal heating apparatus.

It should be remembered that during warm periods, to help keep the temperature low, it is necessary to allow the fruit to cool before placing it in the chamber. A chamber 6 ft. by 6 ft. by 7 ft. will hold fifty cases stacked loosely. Changeable climatic conditions will affect the humidity of the inside of the chamber. If the lemons show signs of withering during the colouring process, it will help to stop this withering if the humidity is increased by placing a dish of water or wet bags in the chamber. To avoid opening the chamber unnecessarily, the thermometer should be placed in the chamber where it can be seen without opening the door. A small window built in the door will allow of easy observation of the interior of the chamber.

PACKING FOR MARKET.

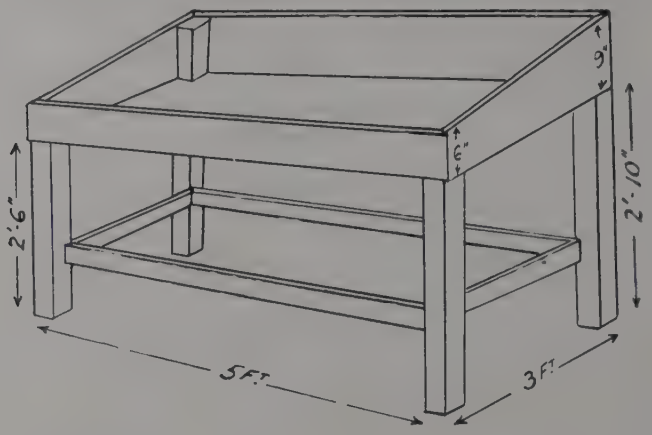
Types of Cases.

The Australian Dump case, 18 inches long by 8⅝ inches wide by 14¼ inches deep, is an excellent case to use for packing lemons. The Canadian Standard case, 18 inches long by 11½ inches wide by 10¼ inches deep, is also an excellent container. Both of these cases lend themselves admirably to the count system of packing. Such cases as the Long Bushel and other types of cases have not the same satisfactory features as those mentioned previously. Cases of the Long Bushel type do not permit of easy packing, being too narrow, causing skin damage to the fruit

through rubbing on the side of the case whilst being placed in the bottom layers. The quantity of fruit touching the wood is also a source of increased damage through pressure and vibration whilst in transit. These cases, being narrow, do not lend themselves to standard-count packing, variation in the type of pack having to be used, making it practically impossible to have a definite system of standard counts for buyers. Most packs in cases of this description give the buyers the impression that the cases are only half-filled, owing to the large number of packs with large spaces showing between the fruit. Buyers, seeing this and not knowing the number of fruit in the case, inevitably cut the price to safeguard themselves.

Wrapping.

It is always advisable to wrap lemons for the market. The wrapping of lemons isolates each individual fruit from the possibility of mould infection from its neighbour, so that in the event of one fruit becoming affected the wrapping paper is a means of preventing infection to the fruit next to it. Wrapping also assists in making a better pack, as there is not the tendency for the layer of fruit to buckle and slip about as when fruit is packed unwrapped. When wrapping lemons, the fruit should be placed in the wrapping paper and the ends of the paper folded under and on to the cheek of the fruit, forming a pad on which the fruit is placed, giving a very finished and neat appearance to the wrapped and packed layer.



Fruit Bench to assist in Grading.

Plate 106 (Fig. 2).—Fruit Bench to Hold Fruit whilst Packing.

Where there is no mechanical sizer this type of bench is very useful. Greatest efficiency is obtained when only one case at a time is tipped for packing. Please note that the bench is higher at the back than at the front, allowing the fruit to always be close at the packer's hand.

Sizing.

Sizing the fruit before packing assists greatly in making packs easy to do and easy to bring to the correct height in the case, although there are packers who find no difficulty in packing unsized fruit by using a roomy bench (See Fig. 2) to hold the fruit and tipping one case only on the bench at a time. The packer then packs two different sizes at the same time, and, while packing, sorts the remaining sizes into separate heaps on the bench. Growers who are fortunate enough to have a mechanical sizer will find the operation of packing made easy, provided care is taken to avoid the pitfalls associated with mechanical sizers. Firstly, it should be remembered that in practically all mechanical sizing machines two different counts of fruit can be packed from each bin, packing being made very easy if this rule is observed. To enable this to be done, it is well to have packing stands of the type illustrated (Fig. 3). Another point well worth remembering with the roller and belt type of sizing machine is to have the correct gear ratio between the carrying belt and the sizing roller. The gear wheels necessary for this to be done should be supplied by the manufacturer with the machine.

Fruit is always sized according to the measurement of its diameter, the following sizes being used:—2 inches, 2¼ inches, 2½ inches, 2¾ inches, and 3 inches. The size is determined by having a set of rings made with these diameters, the lemon being placed on the ring with the stalk up. Any lemon that will fall through a 2¼-inch ring is classified as a 2-inch lemon. Likewise, a lemon that will go through a 2½-inch ring and not through a 2¼-inch is classed as a 2¼-inch lemon. This method is repeated to determine all sizes. A handy gauge can be cut from a piece of three-ply with a washer-cutter or carpenter's expansion bit.

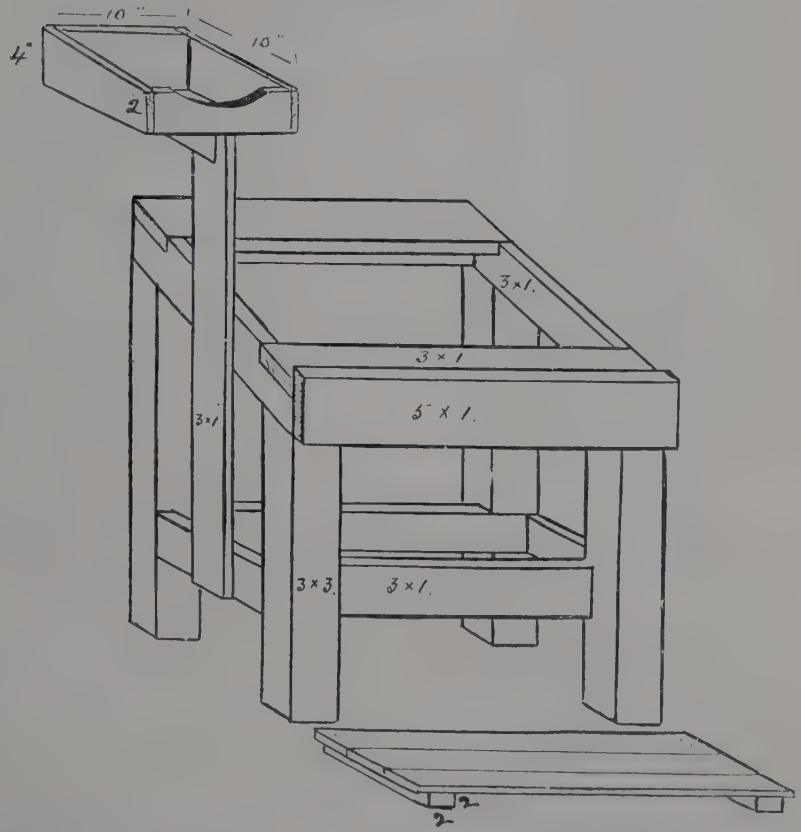


Plate 107 (Fig. 3).—Packing Stand with Paper Holder and Spring Board.

This stand is tilted and holds two cases. The tilt assists the packer by keeping the lemons in position. The packer by packing two cases of different sizes at the same time is assisting himself in his sizing.

Packing.

The standard diagonal check system of packing is best. This pack has the following advantages:—

A given size of fruit will always come to the correct height in the case.

The packed fruit will always appear in straight lines diagonally, across and up and down the case, whether opened on the top, bottom, or sides.

No two lemons will rest upon the other, but in the pockets formed between the fruit of the layer beneath.

The height of the fruit in the case can be governed by making the pockets larger or smaller.

The quantity or number of fruit in the case is always the same for each pack, and can be ascertained at a glance.

By using the packing stand illustrated (Fig. 3), the cases are slightly tilted, which helps to keep the fruit in position, making the packing much easier. The packer stands with the two cases to be packed into in front of him, with the fruit on one side of the cases and wrapping paper on the other. The bench with the fruit on should be made tilted to permit the fruit to run to within easy reach of the packer.

The packs used are called the 3 - 2 (see Fig. 4) and the 2 - 2 (see Fig. 4). These packs get their name from the way the first two lines of fruit are placed in the first layer.

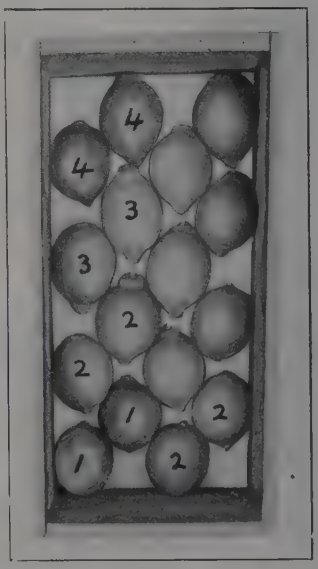
How to Read and Use the Packing Table.

The Layer Count is obtained by counting two lines of fruit from end to end in the case, this layer count being 6 x 6.

3–2 Pack.

The Pack gets its name from the way the first five lemons are placed in the layer.

The Layer Count is obtained by counting two alternate lines of fruit from end to end in the case, this layer count being 4 x 4.



2–2 Pack.

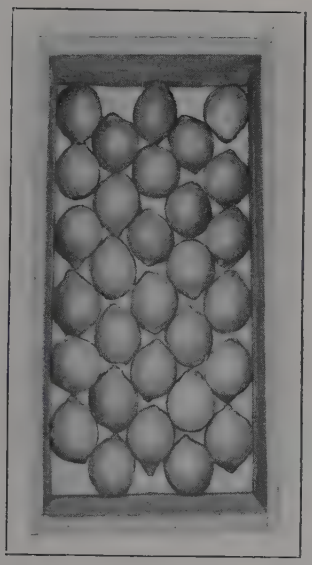
The Pack gets its name from the way the first four lemons are placed in the layer.

Plate 108 (Fig. 4).

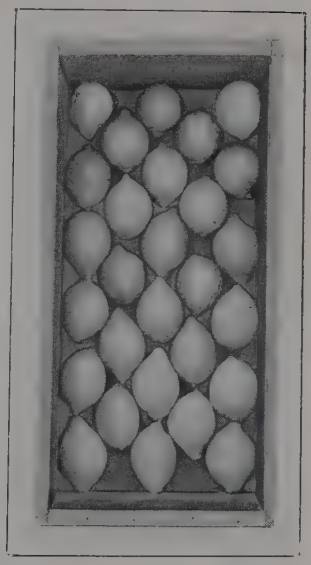
3 x 2 Pack.

In the 3 - 2 pack the first layer is started by placing a lemon in each corner of the case and one exactly midway between them facing end to end in the case, the stalks facing the packer, and the nipples facing to the other end of the case. This forms a line of three lemons with two spaces, or pockets, between them. The pack is continued by placing two lemons in these spaces, which leaves three pockets between the two lemons. We repeat the placing of three lemons in the pockets and then alternately two and three until the layer is finished, except for the last line of fruit; this is reversed with the stalks facing the wood of the case end furthest from the packer. To start the second layer (see Fig. 8), place two lemons in the pockets formed by the first three lemons of the first layer, then two and three alternately facing as in the first layer, until all the pockets of the first layer are filled, again reversing the last line of fruit across the case. This process is repeated layer by layer until the case is filled. With the 3 - 2 pack we get packs containing eight (see Fig. 7) and nine layers (see Figs. 5 and 6). (See packing table.) An easy way for the beginner to be able to know the number of layers in a case is to remember that in the case of the 3 - 2 pack the first, third, fifth, seventh, and ninth layers will start with three at the end, and the second, fourth, sixth, and eighth layers start with two at the end of the layer. The reason for the need of knowing this is explained in the paragraph on bringing the pack to the correct height in the case.

3–2 Packs.
First Layers.



3–2 Pack. 6 × 6 Layers. 9 Layers.



3–2 Pack. 6 × 5 Layers. 9 Layers.

Finished Cases.

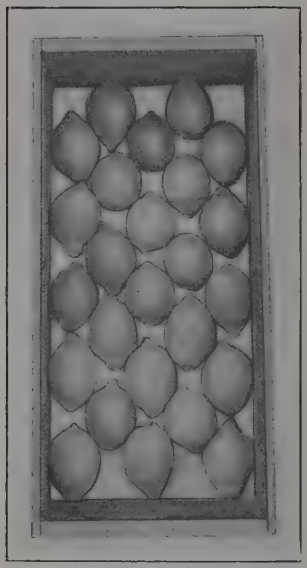
3-2 Pack. 6 × 6 Layer. Total 270.
Lemons wrapped.

3-2 Pack. 6 × 5 Layer. Total 248
Lemons wrapped.

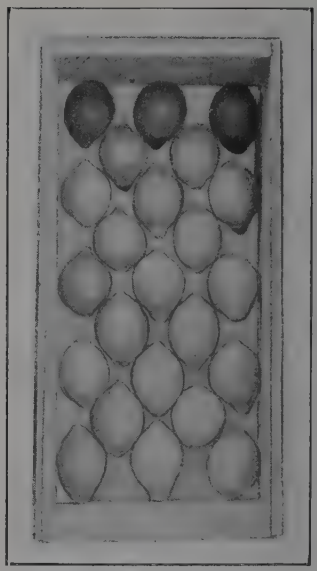
Note the alignment of fruit up and down, across, and diagonally in the case. No two lemons rest one upon the other.

Plate 109 (Fig. 5).

3–2 Packs.
First Layers.

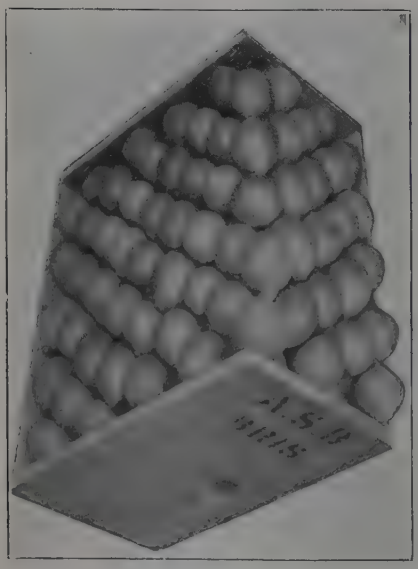


3–2 Pack. 5 x 5 Layers.
9 Layers.

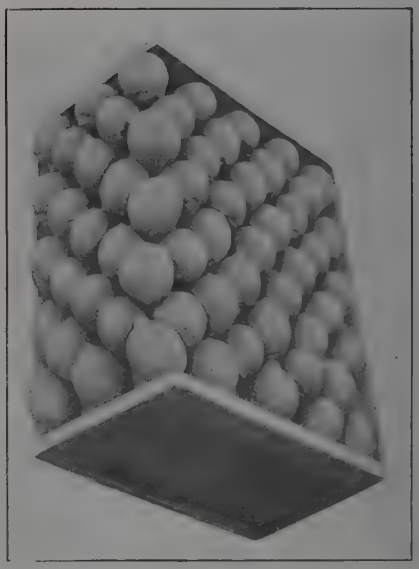


3–2 Pack. 5 x 4 Layers.
9 Layers.

Finished Cases.



3–2 Pack. 5 x 5 Layers. Total 225.



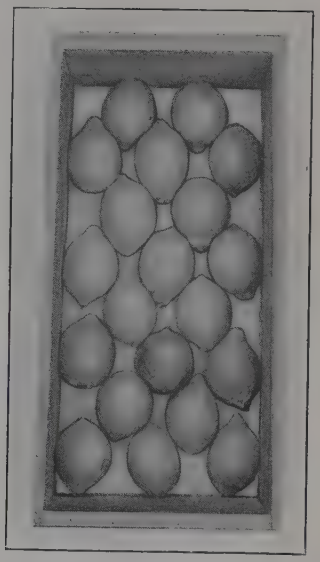
3–2 Pack. 5 x 4 Layers. Total 203.

Note the alignment of fruit up and down, across, and diagonally in the case. No two lemons rest one upon the other.

Plate 110 (Fig. 6.)

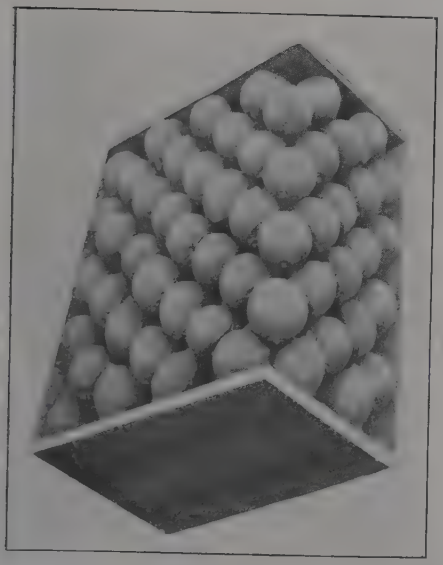
3-2 Packs. 8 Layers.
First Layers.

3-2 Pack. 5 × 4 Layers. 8 Layers.

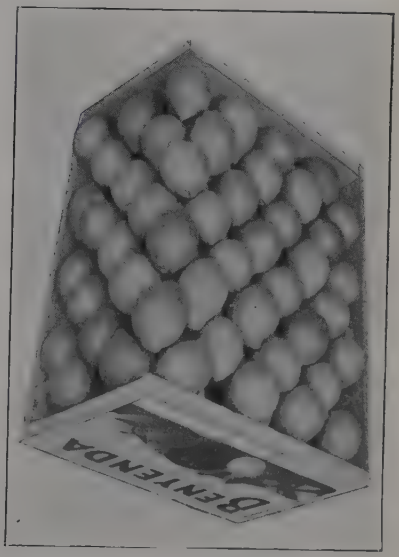


3-2 Pack. 4 × 4 Layers. 8 Layers.

Finished Cases.



3-2 Pack. 5 × 4 Layers. Total 180.
Note.—Do not confuse with 2-3 Pack, which looks the same.

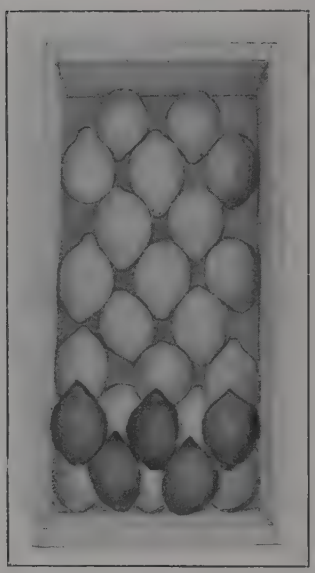


3-2 Pack. 4 × 4 Layers. Total 160.
Note distinctive label.

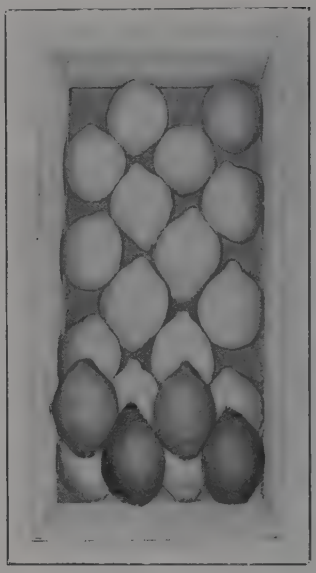
Plate 111 (Fig. 7).

How to Start the Second Layers.

3–2 Pack. 2–2 Pack.



Note how the lemons are placed on the pockets or spaces of the first layer, the second layer starting with two instead of three.



Note how the first two lemons of the second layer are placed on the pockets of the first layer.

Plate 112 (Fig. 8).

PACKING TABLE FOR PACKING IN THE AUSTRALIAN DUMP CASE.

(18 inches long x 8⅝ inches wide x 14¼ inches deep.

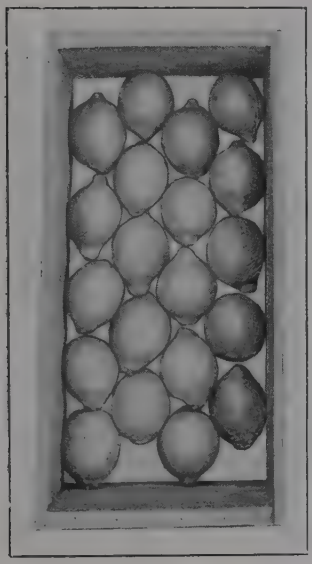
Approximate Size.	Pack.	Layer Count.	Number of Layers.	Total or Count.
2 inches	3-2	6 × 6	9	270
	3-2	6 × 5	9	248
	3-2	5 × 5	9	225
2¼ „	3-2	5 × 4	9	203
	3-2	5 × 4	8	180
	3-2	4 × 4	8	160
2½ „	2-2	5 × 5	7	140
	2.2	5 × 4	7	126
2¾ „	2-2	4 × 4	7	112
	2-2	4 × 3	7	98
3 „	2-2	3 × 3	7	84

Special Note.—In the 180 and 203 count the same number of fruit is contained in each layer, but there is an extra layer in the case. This is brought about by the difference in the diameter of the fruit and the size of the pockets. Close attention to the directions in reference to the 3.2 pack will enable the packer to bring fruit to the correct height.

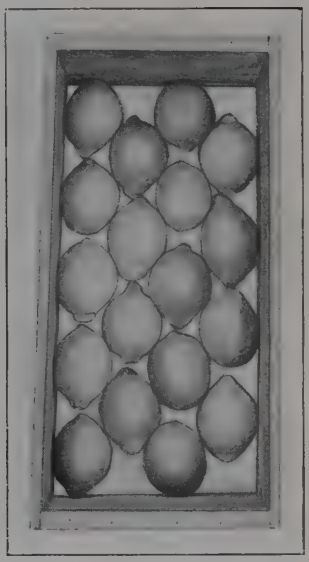
2 x 2 Pack.

This pack is started by placing a lemon in the bottom left-hand corner of the case, and midway between the lemon and the right side of the box a second lemon, leaving two pockets between the two, in which the next two lemons are placed, forming the two-two from which the pack derives its name. (Figs. 9, 10, and 11.) This is then repeated, the lemons being placed facing as in the 3 x 2 pack until the

2–2 Pack. 7 Layers.
First Layers.

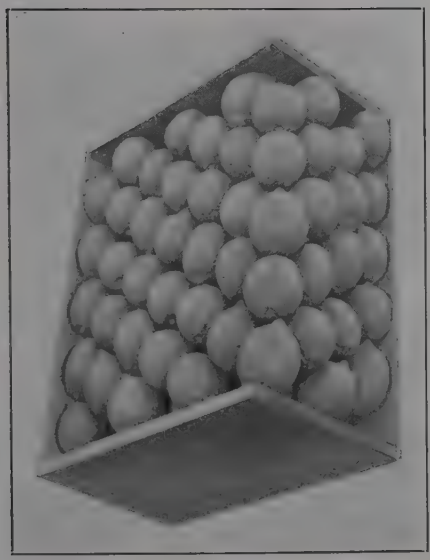


2–2 Pack. 5 × 5 Layers. 7 Layers.

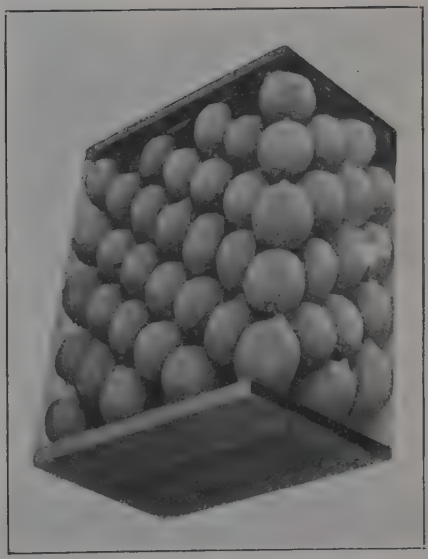


2–2 Pack. 5 × 4 Layers. 7 Layers.

Finished Cases.



2–2 Pack. 5 × 5 Layers. Total 140.

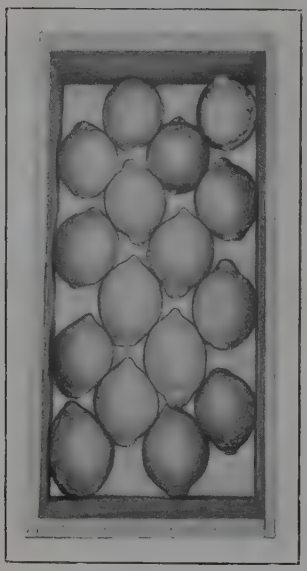


2–2 Pack. 5 × 4 Layers. Total 126.

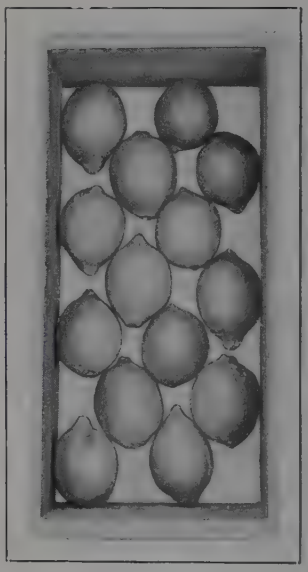
Plate 113 (Fig. 9).

3–2 Packs. 7 Layers.

First Layers.

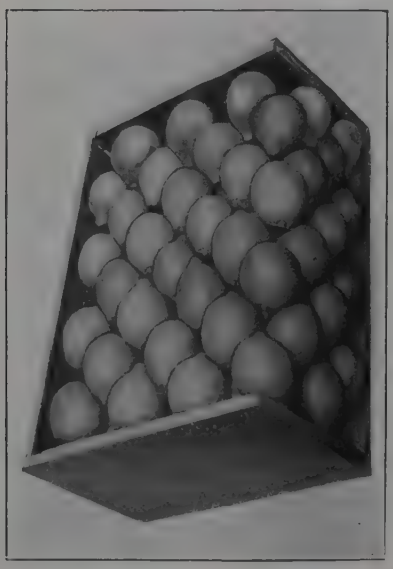


2–2 Pack. 4 x 4 Layers. 7 Layers.

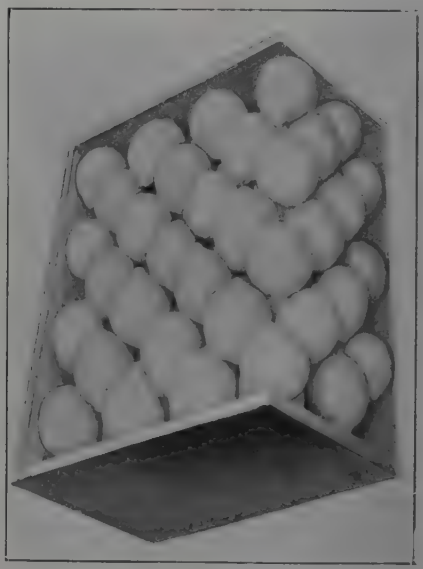


2–2 Pack. 4 x 3 Layers. 7 Layers.

Finished Cases.



2–2 Pack. 4 x 4 Layers. Total 112.



2–2 Pack. 4 x 3 Layers. Total 98.

Plate 114 (Fig. 10).

layer is finished with all but the last line of fruit. This is reversed, with the stalks facing the wood of the case end furthest from the packer. The second layer is started by placing two lemons on the pockets formed by the first two of the first layer (see Fig. 8), the layer being finally finished by placing lemons on all the pockets of the first layer and reversing the last line of fruit as in the first layer. By repeating this layer by layer the case is finished. It will be noticed by referring to the table that the 2 - 2 packs contains seven layers. If close attention to the rule of starting the first layer in the left-hand corner is observed, the number of layers in the case can be easily counted, the first, third, fifth, and seventh layers starting in the left-hand corner, and the second, fourth, and sixth layers starting in the right-hand corner.

Bringing the Pack to the Correct Height in the Case.

Lemons should be packed 1 inch to 1½ inch above the top of the case, and be gently eased into position before applying the lid. After nailing, both the lid and bottom of the case should show a bulge. Care should be taken that the bottom of the case, while nailing, is kept clear of the floor or nailing-down stand. This can be done by placing a block under one end of the case while easing the fruit into position and nailing.

Knowing the number of layers in a case at any stage of packing is a good guide to a packer. By calculating the height the fruit will come to in the case two or three layers before the top is reached, the packer, by applying the rule, "The size of the pockets governs the height of the fruit in the case," can bring the fruit either higher or lower, as necessary. This is done by making the pockets smaller by slightly increasing the size of the fruit, and bringing the fruit higher in the box to correct a pack which will come too low, or, in the case of a pack that is coming high, to open the pockets by reducing slightly the size of the fruit. Usually these faults are caused by a variation in sizing the fruit in the subsequent layers after placing the first layer in position. Cases not of the correct width are often the cause of trouble in bringing to the correct height, but by following the rule governing the size of the pockets this difficulty may be overcome. It should be remembered that it is an offence against the Fruit and Vegetables Act to market fruit in undersized cases.

Packers observing the following rules should have no difficulty in obtaining good results with their packing:—

1. All fruit should be placed on its cheek facing end to end in the case.
2. Reverse the last two or three lemons, as the case may be, in each layer.
3. See that all fruit appears in straight lines from end to end in the case, across and diagonally.
4. No two lemons must rest directly one upon the other, but in the pockets of the layer beneath.
5. The size of the pockets governs the height of the fruit in the case.

After taking care in packing, growers should be careful to attend to the outside appearance of the fruit. A well-chosen label is an attraction to buyers, being quite a cheap advertising medium, the average coloured label costing very little. Growers not marketing fruit in sufficient quantity to warrant an outlay on labels may still make their cases look attractive by neat stencilling. Under the Fruit and Vegetables Act it is necessary for the packer to brand his initials, name, and address legibly and durably within a space measuring not less than 5 inches long by 2 inches wide. The name of the variety of fruit and the size or count should also be branded in letters of not less than ½ inch in length.

Wiring.

A machine for this purpose is obtainable commercially. Wiring is recommended in all cases. Many country-order buyers pay extra to obtain cases wired, as it saves them time and money when they can procure the cases ready wired for long-distance transport.

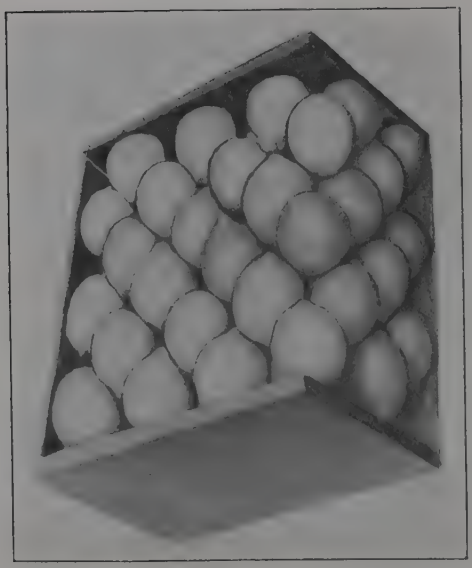
Transport.

As the whole basis of successful marketing is care, growers should follow this principle right to the finish of their share of the handling. Remember, good packing, fancy labels, wiring, or stencilling will not sell bad fruit. All the care taken in putting up a first-grade, attractive package will be of no avail if growers, while carting the fruit to the station and loading into the trucks, do not handle it carefully. Too often we see carters sitting in the middle of packed cases of fruit while on the road. Even good packing will not stand abuse, so in closing I would urge every grower to handle his fruit from the tree to the rail or market as carefully as he would handle a basket of eggs.

2–2 Pack. 7 Layers.
First Layers.

2–2 Pack. 3 x 3 Layers. 7 Layers.

Finished Case.



2–2 Pack. 3 x 3 Layers. Total 84.

Plate 115 (Fig. 11).

BREEDING OF PEDIGREE DAIRY CATTLE.

By CHAS. McGRATH, Supervisor of Dairying.

THE effect of the financial stringency is being felt by breeders of pedigree dairy cattle. An opinion has been expressed by a few who do not come in contact with the activities of stud-masters that their business has been highly lucrative, an impression conveyed no doubt by the prices secured for a few individual sires bred on lines of blood noted for high production and purchased by breeders desiring to secure some coveted blood lines.

The most successful of breeders realised that there is little to enthuse over at the present time. All actively associated with breeding of stud stock also realise that it is becoming very difficult for breeders to carry on under the present conditions. It is further realised that the work of our stud-masters is an all-important factor in placing the dairy industry on an efficient foundation.

No dairy farmer can afford to ignore the value of breed for production sires. Pedigree is the foundation of all stock breeders' activities, and neglect of this fundamental factor leads to deterioration of our herds. An inferior herd of cattle is evidence of the lack of appreciation by its owner of the part that pedigree plays in the conduct of his business. A stockowner without the instinct of a breeder retards the progress of the industry he is engaged in.

The work of the pioneers in the breeding of pedigree dairy stock has never been fully appreciated at a fair value. Its worth to the dairy industry would be difficult to overestimate, and in the interests of the industry and the State every encouragement must be given so that the numbers of our pedigree herds shall not diminish.

In centres throughout the State where the dairying industry is established, there is evidence of the importance of the breeding of high-class dairy cattle in the improvement of dairy herds, thereby ensuring progress and stability of the industry.

It is heartening to know that the financial stringency has not effaced the instincts of many of our studmasters, or deterred them in their endeavours to further improve their herds by the introduction of high-class dairy stock from overseas. Such activity must have a very great influence on stud stock breeding, and in obtaining a general all-round improvement in the standard of the commercial dairy cattle of Queensland.

KAIRI SCHOOL OF INSTRUCTION FOR BOYS.

Mr. J. A. L. Sides, Hon. Secretary, Kairi Farm Boys' Camp, writes:—The School of Instruction for Boys at the Kairi State Farm has been brought to a most successful conclusion.

Fifty-five boys nominated to attend, but one of these was prevented from taking part owing to sickness.

Officers and boys entered into the spirit of the camp, and the keenness of the boys, both in competition and their desire to obtain knowledge, was a noteworthy feature. The instructors got right down to the boys' standard and led them along, the boys greatly assisting by asking questions as instruction proceeded. It was particularly pleasing to note how quickly the spirit of comradeship developed between instructors and boys, and after each lecture an eager group of boys would gather round the instructor—notebook in hand—hoping to obtain further information bearing on their own particular problems.

The course of instruction was most popular from start to finish, and all the boys are eagerly anticipating the next camp.

The value of the officers of your Department to the man on the land has been presented in a new light; and many parents have already stated that they had no idea such valuable information was available to them just for the trouble of asking. Your officers have been brought more directly into touch with the people, as a result of which their work will be easier, and the information they supply more eagerly applied.

We ask you to accept our sincerest thanks for the courteous and generous manner in which your Department supported this (our first) camp. We also wish to thank, through you, the officers of your Department whose services you made available to us, for the able and courteous manner in which they carried out their duties.

PLATE 116.—YOUNG FARMERS AT THE BRISBANE SHOW.

His Excellency the Governor, Sir John Goodwin, is seated in the centre of the group, which also includes members of the Council of the Royal National Agricultural and Industrial Association, and Departmental Officers. Ten of the boys represented Junior Farmers' Clubs of New South Wales, and with them were 25 Queensland club members.

PRODUCTION RECORDING.

List of cows officially tested by officers of the Department of Agriculture and Stock and which have qualified for entry into the Advanced Register of the Herd Book of The Australian Illawarra Shorthorn Society, The Jersey Cattle Society, and The Friesian Herd Book of Australia. The final tests of these cows were carried out during the months of July and August, 1931 (273 days' period unless otherwise stated).

Name of Cow.	Age.	Milk Production.	Butter Fat.	Owner.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Queenie 3rd of Pine View ..	Mature ..	11,667·75	409·768	Hickey and Sons, Wilston
Gift 5th of Yaralla	Mature ..	10,210·75	377·946	Hickey and Sons, Wilston
White Park Pet 11th	Senior (4 years)	11,414·75	407·383	W. T. Savage, Barnesmore
Gift 8th of Yaralla	Senior (4 years)	9,997·75	363·066	Hickey and Sons, Wilston
Mermaid 4th of White Park ..	Senior (4 years)	8,844·125	340·29	W. T. Savage, Barnesmore
Melba 6th of Rosemount ..	Senior (4 years)	8,153·45	333·478	A. J. Bryce, Maleny
Empress 9th of Rosemount ..	Junior (4 years)	12,619·75	508·604	C. O'Sullivan, Ascot Factory
Whitewings of Bellwood ..	Junior (4 years)	8,211·5	315·727	W. G. Currant, Gunalda
Flower 10th of Rosemount ..	Senior (3 years)	12,469·875	461·105	C. O'Sullivan, Ascot Factory
Eileen 6th of Rosemount ..	Senior (3 years)	10,565·875	393·537	C. O'Sullivan, Ascot Factory
Fancy 9th of Rosemount ..	Senior (3 years)	9,822·8	383·765	A. J. Bryce, Maleny
Jewel of Beechwood	Senior (3 years)	8,951·7	354·419	A. Marks, Atherton
Crimsie 3rd of Tula Stud (269 days)	Junior (5 years)	7,609·6	311·358	A. Marks, Atherton
Dolly 3rd of French View ..	Senior (2 years)	7,946·75	332·324	W. J. Barnes, Cedar Grove
Scarlet 13th of Springdale ..	Senior (2 years)	8,101·5	327·231	E. Lightbody, Pimpama
Peggy 2nd of Glenrock ..	Senior (2 years)	8,716·625	314·335	A. Kamholtz, Nerang
Elsie 3rd of Kingsdale ..	Senior (2 years)	7,178·2	282·77	A. A. King, Mooloolah
Foremost 3rd of Blackland ..	Junior (2 years)	9,903·008	355·155	A. Pickels, Wondai
Model of Aurora	Junior (2 years)	7,345·5	295·972	R. Eichmann, Mundubbera
Princess 2nd of Trevor Hill ..	Junior (2 years)	7,776·15	284·668	G. Gwynne, Southbrook
Princess 7th of Kingsdale ..	Junior (2 years)	6,388·2	259·475	A. A. King, Mooloolah
Diamond 3rd of Headlands ..	Junior (2 years)	6,374·866	257·628	G. Heading, Murgon
Beauty 5th of Rhodesview ..	Junior (2 years)	6,903·779	255·934	W. Gierkie and Sons, Helidon
JERSEYS.				
Lindley Lady Prim	Mature ..	8,541·75	476·462	A. Bulow, Mulgeldie
Mascot's Girlie of Burnleigh ..	Junior (4 years)	8,035·0	427·67	F. T. Teske, Nambour
Treasure of Burnleigh (259 days)	Junior (4 years)	6,620·05	324·525	W. W. Mallett, Nambour
Joy of Woodstock	Junior (4 years)	5,986·375	315·218	P. C. Henman and Sons, Mudgeeraba
Prospect Dewdrop 16th ..	Senior (3 years)	7,123·5	378·757	E. L. Melville, Toogoolawah
Glengarriffe Nobles Langtry 2nd	Senior (3 years)	5,597·7	311·111	C. E. C. F. Young, Imbil
May 3rd of Grasmere	Senior (3 years)	5,744·95	294·593	A. Dawson, Malanda
Floss 23rd of Grasmere ..	Junior (3 years)	6,072·8	314·216	A. Dawson, Malanda
Trinity Tinklebell (210 days)..	Junior (3 years)	5,184·0	271·441	J. Sinnamon, Goodna
Calm 4th of Grasmere ..	Senior (2 years)	5,174·5	287·848	A. Dawson, Malanda
Prides Crystal of Burnleigh (365 days)	Junior (2 years)	8,087·5	436·693	W. W. Mallett, Nambour
Silver Star of Hazeldean ..	Junior (2 years)	6,289·25	353·658	A. Bulow, Mulgeldie
Burrawong Lady Linda ..	Junior (2 years)	6,462·55	320·105	R. J. Bott, Yandina
Majesty's Joyce of Brooklands	Junior (2 years)	5,580·759	313·690	J. Williams, Wondai
Eva of Brooklodge	Junior (2 years)	5,831·15	289·994	J. Teske, Nambour
Nan 3rd of Woodlands ..	Junior (2 years)	5,850·25	259·44	D. R. Hutton, Cunningham
Lustre of Lisieux	Junior (2 years)	4,353·5	242·023	J. Williams, Wondai
Trecarne Ettna	Junior (2 years)	4,116·958	240·973	T. A. Petherick, Lockyer
Dewdrop 3rd of Golden Hill ..	Junior (2 years)	3,766·5	232·868	C. F. Klause, Mundubbera
FRIESIAN.				
College Pontiac Princess (365 days)	Mature ..	24,158·75	816·995	Hickey and Sons, Wilston
Holly Hock 2nd of Oaklands..	Mature ..	11,629·969	446·303	W. Richter, Tingoora
Holy Hock 2nd of St. Athan..	Mature ..	10,964·758	413·792	W. Richter, Tingoora
Beauty of Oaklands	Mature ..	9,061·535	406·496	W. Richter, Tingoora
Dairymaid of Oaklands ..	Mature ..	10,794·875	206·101	W. Richter, Tingoora
Pet 2nd of Oaklands	Mature ..	10,961·818	384·552	W. Richter, Tingoora
St. Athan Bee (365 days) ..	Senior (2 years)	18,008·229	564·498	W. Newman, Wyreema
St. Athan Doe	Junior (2 years)	11,014·4	355·01	W. Newman, Wyreema
Rosey Rock of Oaklands ..	Junior (2 years)	7,031·036	285·658	W. Richter, Tingoora
Holly 3rd of Oaklands ..	Junior (2 years)	7,602·996	282·554	W. Richter, Tingoora

CO-OPERATION APPLIED TO THE POULTRY INDUSTRY.

By C. KIDD.

The story of the progress of the Poultry Farmers' Co-operative Society has been well described as a romance of industry. The society is an example of pure co-operation, a happy combination of the ideal and the real made possible by men of vision, energy, and practical business sense working unselfishly in a common cause. Mr. Kidd is a well-known leader in the poultry industry, and his account of the development of its commercial side will be read with interest by all concerned in the success of practical co-operation in primary industry.—Ed.

THE story of the progress of the Poultry Farmers' Co-operative Society has been referred to as a "romance of industry," and indeed its growth in ten short years cannot be described in any other terms.

It is the outcome of an ideal—the desire to mutually assist in the organisation and betterment of the poultry industry in this State—and practical minds have translated the ideal into a tangible realisation.

The poultry industry, perhaps more than any other, was in need of organisation. It was producing considerable wealth for the State, but its several units had been so diffusing their energy that the true value of their collective efforts had not been realised nor the possibilities of the industry visualised by the average citizen.

Poultry-raising is an industry requiring the application of business methods, and profits per bird being very small it is essential to make every possible saving in production costs to show a satisfactory return.

The National Utility Poultry Breeders' Association has consistently championed the cause of the poultrymen, and it is due to the enterprise and enthusiasm of its members that the organisation now known as the Poultry Farmers' Co-operative Society was established in 1921.

Many of the members were not dependent on poultry-raising for a living, but had become associated with poultrymen through a lively interest, as amateurs, in the industry. They were quick to appreciate the difficulties under which poultrymen were struggling, and realising what a valuable place poultry farming might and should occupy in the State's agricultural operations, conceived the idea of promoting this co-operative organisation to purchase and distribute foodstuffs, these being the most expensive items in the business of poultry-raising. They recognised that co-operative principles would ensure honest trading, pure and high quality goods, and a saving of money by reducing the distributing cost of poultry foods. Further, *it ensured that any profits resulting from the undertaking would remain in the industry.*

Education in Co-operation.

The society is something more than a trading concern. It has an intimate knowledge of the requirements of its customers and, in addition to providing a service in regard to delivery which was previously unknown, it disseminates knowledge on poultry culture and offers free advice on any subject bearing on the industry, both verbally and by means of printed pamphlets. It is difficult to assess the value of the service the society has rendered to the industry, and it has been instrumental in lightening the poultryman's burden considerably by securing reductions in freight charges and improving generally the status of the industry, irrespective of the great saving in prices which have resulted from the combined operations of its members.

Apart from the small annual dividend on the capital invested, the whole of the profits of the society are distributed each year among members as a bonus on purchases, or used in the business for the creation of further benefits. In this way more than £11,000 has been returned to the society's customers during the past two years.

The Progress of the Society.

The society has just celebrated its tenth birthday, having been established in July, 1921, when there were eighty-five members, who contributed a total share capital of £514. The present membership is 800, and the share capital exceeds £4,000.

In July, 1921, 8 tons of bran and pollard were purchased by the society's members. The present output is more than fifty times greater, being over 5,000 tons, or 500,000 bushels annually. In addition, over 100,000 bushels of wheat are used as grain, besides huge quantities of maize, barley, oats, and other cereals.

PLATE 117.—EXECUTIVE OF THE POULTRY FARMERS' CO-OPERATIVE SOCIETY.

Left to Right.—Messrs. R. H. Woodcock, Manager; W. H. Campbell, Director; S. Lloyd, Chairman of Directors; A. S. Walters, Director; C. Kidd, Secretary.

The first store secured for the society's business was in the basement of a bulk store in Little Roma street. Mr. Woodcock, the present manager, combined the duties of director, manager, secretary, storeman, and clerk.

Trans-Marine Trade.

The society, in 1923, exported 35,000 dozen eggs to England, and in so doing made history, for it was the first occasion on which a co-operative or poultrymen's organisation had shipped Queensland eggs overseas.

The growth of the business is best shown by the following figures:—Turnover for eighteen months ending 31st December, 1922, £20,217. For year 1923, £12,276; 1924, £12,130; 1925, £22,166; 1926, £41,993; 1927, £57,760; 1928, £83,472; 1929, £109,075; 1930, £104,240.

The society, in October, 924, manufactured the first bag of "Red Comb" laying mash, and in so doing launched a new industry for the State. Prior to that date all manufactured balanced poultry foods were imported. This branch of the business has grown rapidly, and new plant has just been installed, with a capacity of 500 bags daily.

So successful have been the results that the society is now turning out "Red Comb" dairy food, calf food, and pig food, and these give every indication of becoming as popular as the other "Red Comb" products.

Apart from the large sums paid to members as bonus on purchases, the society has saved the industry tens of thousands of pounds in the first cost of the articles sold. It has created a healthy competition to the advantage of its members and the industry generally.

Huge purchases on a co-operative basis are a benefit to farmers dealing from the society, and low overhead and working expenses have permitted profits to be made, notwithstanding the small margin over cost which the management allows. These profits, instead of being used for private gain, are retained in the industry.

THE MANUFACTURE OF POULTRY FOODS.

Recently the Hon. Harry F. Walker, Minister for Agriculture and Stock, performed the opening ceremony in connection with new units of machinery installed at the society's headquarters, Red Comb House, Brisbane.

The additions consist of a pulveriser for reducing lucerne chaff and whole grain to meals, and an automatic mixing machine for measuring and mixing the various constituents of balanced poultry and stock foods.

The pulveriser is fitted with steel beaters which rotate at the rate of 2,900 revolutions per minute, and which reduce the lucerne or grain to a fine meal. This is then elevated to the upper floor and discharged through shoots, either into bags for sale or diverted into one of the hoppers connected with the mixing plant. The latter consists of a series of hoppers each intended to carry one of the ingredients to be mixed. These hoppers are filled to capacity. They discharge at the bottom, the flow being governed by the speed of a worm drive which is fitted with a micrometer adjustment so that a few ounces or several pounds of a given commodity can be delivered in a stated period. Once the machines have been adjusted, the whole of the operation of weighing out and mixing the ten or eleven different elements of the prepared foods is done automatically.

A worm conveyor running the full length of the rows of hoppers receives the discharge from the latter, and in transit the meals are thoroughly mixed before being delivered, several minutes afterwards, into another conveyor, where they join the bran and pollard and cod liver oil. They then proceed to be mixed in another 17-feet conveyor, and finally elevated and discharged into the waiting bags by automatic packers.

The arrangement of the plant enables lucerne chaff and whole grains to be fed to the machines, and they are untouched by hand until delivered as complete balanced foods.

The plant also includes a roller mill fitted with two pairs of 40-inch rollers 10 inches in diameter. This is used for rolling oats, cracking corn, and also for making fine meals. Its capacity when cracking maize is 230 bushels per hour. Used in conjunction with another series of hoppers and emptied by "shoe" mixers into a worm conveyor, this machine also manufactures the well-known "Red Comb" chick food. A dressing reel, a machine fitted with rotary sieves, is used for removing any husks, and its operation ensures the purity and even quality which is characteristic of all "Red Comb" products.

The Poultry Farmers' Co-operative Society may be described fittingly as a working model of true co-operation in which the best and most economic service is ensured to its members, and team work, combined with sound business management, are the main factors in its success. It is an excellent example of the interlocking of primary and secondary industry under producer-consumer control.

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Carpet Grass.

J.O.J. (Glasshouse Mountains)—

The grass is *Axonopus compressus* (Syn. *Paspalum compressum*), the Carpet Grass, and one that has been boomed a good deal as a fodder, but of which one receives varying reports. On certain classes of country, particularly some of the damp sandy land inclined to be swampy, such as where you have it growing and where better class grasses such as ordinary Paspalum and Rhodes will not thrive, it would seem to have considerable value.

Carpet Grass.

C.O. (Kin Kin)—

Paspalum compressum, or Carpet Grass, is suitable for growing on poorer class coastal soils unsuited for the growing of ordinary Paspalum or of Rhodes. In the better-class country it should, where possible, be eradicated from pastures. On the subject of a suitable spray, Mr. Brünnich, Agricultural Chemist, advises as follows:—"The weedicide, Sodium chlorate, may be used, as it is only slightly poisonous as compared with arsenic, and as it is sprayed on very lightly it is not likely that stock would consume sufficient sprayed grass to do any harm. If containers or bags with the poison are left about, it may, on account of its salty taste, be consumed in sufficient quantity to be fatal. A.C.F. & Shirley's Fertilizers sell this weedicide, and also a new preparation, chiefly lime chlorate, which is less liable to cause fire on the dried weeds or cloth, &c."

Native Bryony.

T.B. (Silkwood)—

The specimen is the Native Bryony (*Bryonia laciniosa*), a plant poisonous to stock. The berries have rather a nauseating taste, but nevertheless they have been eaten by children at odd times, causing severe illness, though we do not know that death in any case has actually followed. This plant generally disappears after the land has been brushed and cleared, as it is one that naturally grows among bushes or over fallen logs and among weeds in newly-burnt scrub. As the plant disappears with the opening up of the land, and putting it under grass, no particular trouble regarding its eradication is generally taken by farmers, but the Agricultural Chemist has been asked to send you a spray non-poisonous to animals that you might use if you so desire.

"Native Rhodes Grass."

T.C. (Gladstone)—

Your specimen is *Chloris virgata*, sometimes called Native Rhodes Grass. We do not think that seed is, as a general rule, stocked by nurserymen, but once it becomes established it seeds very abundantly and spreads itself naturally. If you prefer, seed can be gathered and sown in the same way as Rhodes grass. The plant is very closely allied to Rhodes grass, but, generally speaking, is not regarded as having so much value as a fodder.

Ellangowan Poison Bush.

F.R.D. (Barcaldine)—

The plant is *Myoporum deserti*, commonly known as the Ellangowan Poison Bush. It belongs to a dangerous family, and has been accused of poisoning stock in Queensland and New South Wales at different times. No actual feeding tests, so far as we know, have been carried out on the plant, but the symptoms that have been given in some previous cases agree closely with yours, and it is quite likely that under the circumstances this plant is the cause of the trouble.

A Doubtful Fodder Plant.

T.V. (Kairi, N.Q.)—

The specimen is *Phaseolus semi-erectus*, a native of tropical America, now a naturalised weed in most tropical and subtropical countries. It was introduced into Australia many years ago as a fodder, but our experience has been that stock rarely touch it, or at least not to any extent. The plant has been grown quite successfully in some places as a green manure, and is not known to possess any poisonous properties.

A Lichen.

A. McL. (Springsure)—

The specimen is not a Fungus, but is a Lichen. We cannot give you the specific name, as that would be the work of a specialist. However, we suppose it is in the plants as a whole that you are more particularly interested. Lichens are plants composed of the interlacing roots of a fungus, among which are found the cells of fresh water Algæ, the peculiar colouration being due to a combination of the two components. This combination also allows lichens to grow where neither the fungus nor the alga could live alone, such as bare rocks, tree barks, dry ground, and so forth. As a whole, lichens are much more abundant in colder places than in the tropics and subtropics; for instance, in Queensland our largest lichens grow in the colder parts of the State, such as the higher parts of the MacPherson Range, where there is abundant moisture. As a general rule, they are plants of no particular economical importance, except that in northern latitudes one of the species, the so-called Reindeer Moss, serves as food for reindeer and caribou.

Poinciana Bloom.

QUERIST (Brisbane)

Poinciana trees growing vigorously and in good soil generally take longer before they reach the flowering period than trees of a more stunted nature growing in poorer soil. These latter generally start flowering when about seven or eight years old, but more vigorous growing trees are commonly over ten years old before they commence to flower.

"Headache Vine."

INQUIRER (Brisbane)

The specimen collected at Imbil is *Clematis glycinoides*, the Native Clematis or Headache Vine. The name Headache Vine arises from the fact that if the fresh leaves are crushed up in the hand, and the odour inhaled very strongly, the eyes and nose run, and headaches are said to be cured.

A Native Fodder Plant.

Mr. Fred. Tinsley, Crown Lands Ranger, Charters Towers, writes under date of 2nd July as follows:—

"When recently on a tour of inspection on the basalt tableland country which comprises the Lolworth Expired Pastoral Holding and Grazing Farms Nos. 96, 189, 223, and Preferential Pastoral Holdings Cuba and Bubbling Springs, I came across a weed, a sample of which I am herewith sending you. This weed is causing some interest on that part of my district, for the reason that it is eagerly sought after by all classes of stock. From inquiries I find that the weed enclosed is a new growth, and only made its appearance on the tableland this year, and in view of this circumstance the settlers up there asked me to write you and ascertain the name of it. I am herewith asking to be supplied with the name and also if it is an old weed."

The weed forwarded by Mr. Tinsley is *Lotus australis*, the Native Birdsfoot Trefoil, undoubtedly a very valuable forage plant relished by all classes of stock. Unfortunately, it contains, like the Sorghums and some other valuable fodders, a prussic-acid yielding glucoside, and in consequence deaths from eating it have been reported at odd times. Most of those plants with a prussic-acid-yielding glucoside seem to affect hungry travelling stock that come on to them on an empty stomach more than they do ordinary paddocked animals. The Fuchsia Bush (*Eremophila maculata*) is a case in point.

General Notes.

Official Purebred Tests.

Included in the list of cows that completed their long-distance test during the months of July and August, 1931, and qualified for entry into the Advanced Register of their respective Herd Books are representatives of the herds of many of our leading breeders of dairy cattle.

With a yield of 508.604 lb. butter fat in 273 days, Empress 9th of Rosemount, an A.I.S. junior 4-year cow owned by Mr. C. O'Sullivan, of Ascot, Darling Downs, is at the head of the list, followed by Lindley Lady Prim, a Jersey mature cow owned by Mr. A. Bulow, of Mulgeldie, which produced 476.162 lb. of fat in 273 days. With a yield of 816.995 lb. of fat in 365 days, College Pontiac Princess, a Friesian mature cow, the property of Hickey and Sons, Wilston, heads the list, St. Athan Bee, a senior 2-year old Friesian, gaining second place with a yield of 564.498 lb. of fat in 365 days.

Australian Oranges the Best.

"They were considered to be the best oranges that Canada has ever imported, and contained more juice than any that had ever come to Vancouver."

This eulogistic report has been received by the Murrabit Packing Company Proprietary, Ltd., Victoria, from its agent in Vancouver on a shipment of 200 cases of naval oranges packed by it and forwarded by the Aorangi, which left Sydney on 23rd July last.

The report says that the consignment arrived in perfect condition, as if freshly picked from the trees. The agent arranged to display and sell the whole consignment at the Vancouver Canadian-Pacific Show. Various offers to sell fruit were received, including one from the Hudson's Bay Company.

Tests for weight made with ten cases of the Murrabit oranges and ten cases of other brands showed 10 lb. a case in favour of the Murrabit fruit.

Miss Laverock, M.A., a culinary and dieting expert, stated that the consignment was superior to any oranges that she had tasted from California, Florida, or Spain.

The Control of Cabbage Pests.

The Minister for Agriculture and Stock (Mr. H. F. Walker) made reference recently to the fact that the control of cabbage pests, particularly leaf-eating caterpillars, had been engaging the attention of the Department during the last few months. Such attention was necessitated by the fact that arsenate of lead had in recent years been used by a number of cabbage growers during the later stages of the growth of the cabbages. This practice had led to large condemnations of cabbages, and had also prejudiced consumers against the use of that vegetable.

Experiments conducted last summer by the Departmental entomologist at Stanthorpe, in co-operation with a local grower, had yielded a satisfactory degree of control by the use of a derris product. This result was obtained in a season during which cabbage caterpillars were abnormally abundant.

Mr. Walker added that arrangements are being made by his Department for the carrying out of further field experiments on the control of cabbage pests during the spring and summer months of this year. These experiments will be conducted at Stanthorpe and in the vicinity of Brisbane, and are intended to definitely determine what sprays, other than arsenical and similarly undesirable chemicals, will yield a satisfactory degree of control on an economically sound basis. Among the sprays to be tested are pyrethrum and derris products and kerosene emulsion.

It would seem that the class of sprays just mentioned offers the best prospects of success in the search for an alternative to arsenate of lead. It must be remembered, however, that any spray, to be successful, should be applied in the early stages of growth. Too frequently spraying is neglected until the later stages, by which time the infestation has reached very serious proportions. In addition to spraying, some measure of assistance in control may be obtained by strict attention to farm hygiene, which includes the destruction of unmarketable cabbages and any other débris on which the caterpillars can breed.

Pineapple Levy Regulations.

The Governor in Council has approved of the issue of Regulations under the Fruit Marketing Organisation Acts empowering the Committee of Direction of Fruit Marketing to make a levy on all pineapples marketed for the twelve months beginning on 17th September, 1931, and ending on 16th September, 1932.

These Regulations are similar to those which were in force last year, except that they differentiate between Ripley and rough pineapples and smooth-leaf pineapples sold on the market, the same charge being on all varieties going forward to canneries.

For smooth-leaf pineapples the levy shall be at the rate of 2d. per case of pineapples in containers; and when sold loose, at the rate of 2d. for every 24. For rough and Ripley varieties the levy shall be ½d. per case; and when sold loose, at the rate of ½d. for 42. For all varieties sent to canneries, the levy shall be 2½d. per case of pineapples with "tops on," or 3½d. with "tops off."

Part of the sums raised by the levy shall be used to meet any loss, if any, on processed pineapple products processed in Queensland with the authority of the Committee of Direction or exported overseas, and the balance shall be expended in the interests of the pineapple industry.

Definition of Cotton-Grower.

The Governor in Council has approved of the issue of an Order in Council under the Primary Producers' Organisation and Marketing Acts amending the constitution of the Cotton Board in respect of the definition of a cotton-grower.

The amended definition now provides that the class of persons who shall be deemed to be growers and eligible to vote on any referendum or election in connection with the Cotton Board shall be those who, during the twelve months immediately preceding the referendum or election, delivered to ginneries seed cotton which was grown by them on land of which they were owners or tenants, or who, at the time of the referendum or election, have growing not less than one acre of cotton on land of which they are owners or tenants.

Canary Seed Board Hail Insurance Scheme.

The Governor in Council has approved of the issue of Regulations under the Primary Producers' Organisation and Marketing Acts which provide for a hail insurance scheme by the Canary Seed Board.

The Regulations provide that the Canary Seed Board shall establish a Hail Insurance Fund for the purpose of paying to canary seed growers compensation in respect of losses sustained to crops through hailstorm damage, and for defraying the costs incidental thereto.

The fund shall be created by a levy in the form of a *pro rata* premium charge against growers calculated on the basis of the quantity of canary seed harvested and that on which hail insurance compensation is payable each year, and this fund shall be known as the Canary Seed Board Hail Insurance Compensation Fund.

The levy shall be a charge against the grower, and may be deducted from advances, but the sum chargeable in any one year shall not exceed 7½ per cent. of the total value of the seed insured during the same year. All seed shall be covered from the time it is out in ear until harvested, but such cover shall not extend beyond the 31st January in any year.

Every grower shall carry his own risk to the extent of the first 5 per cent. of the crop on the area damaged on each plot.

The Board may appoint assessors to assess losses.

Provision is made in the Regulations that at least fifty growers who, during the last twelve months, have harvested for sale canary seed produced in the State may make, in writing to the Minister, on or before the 19th October, 1931, a request for a poll of all growers on the question of the levy proposed to be made. Such poll shall be held by the Under Secretary, Department of Agriculture and Stock, Brisbane, if a petition, as above, is lodged before the date specified. If such poll should be unfavourable, the levy will not be made.

Caloundra a Sanctuary.

The township of Caloundra has been declared a sanctuary under the Animals and Birds Acts, in which it shall be unlawful for any person to take or kill any animal or bird.

A Sanctuary at Inkerman.

The Inkerman Irrigation Area has been declared a sanctuary under the Animals and Birds Acts, in which it shall be unlawful for any person to take or kill any animal or bird.

Honey Board.

The Governor in Council has approved of the issue of a Regulation under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1930," extending for a further twelve months the Honey Board Levy Regulations which were approved on the 21st August, 1930, and which empower the Honey Board to make a levy on growers of honey and beeswax at the rate of 1½ per cent. on all honey and beeswax sold during the period of the existence of the Regulations, to provide for the administrative expenses of the Board.

Returning of Whey to Farm.

The pasteurisation of whey at the factory is essential and is compulsory under the Dairy Produce Act. Unless the whey tanks at the factory are thoroughly cleansed daily, they become a contributory factor in the deterioration of some milk supplies. When the whey is returned in the milk cans it is essential in the interests of the industry that the cans be emptied of the whey immediately on return to the farm, and that they be thoroughly washed and scalded with boiling water and left to drain and air.

The Broom Millet Board.

The Governor in Council has approved of the issue of an Order in Council under the Primary Producers' Organisation and Marketing Acts, giving notice of intention to extend the operations of the Broom Millet Board for a further period of three years from the 1st November, 1931, to the 31st October, 1934. The Board was first constituted in March, 1926, and extended in March, 1929. The present Board's term will expire on the 31st October next.

The Order in Council makes provision for a petition signed by not less than 10 per cent. of the growers of broom millet to be lodged on or before the 12th October next, requesting that a ballot be conducted to decide whether or not the Board shall continue to function for the extended term abovementioned.

Nominations will also be received for the election of two growers' representatives, and such nominations must be signed by at least five persons who have grown broom millet for sale since 30th October, 1930.

Tomatoes and the Committee of Direction of Fruit Marketing.

A regulation was issued recently under the Fruit Marketing Organisation Acts, empowering the Committee of Direction of Fruit Marketing to conduct a ballot of tomato growers to decide whether or not the Committee of Direction should acquire all tomatoes grown in certain specified districts in Southern Queensland.

The ballot, which closed on the 31st August, resulted in 68.9 per cent. of the votes polled being in favour of the acquisition, and the Governor in Council has approved of the issue of an Order in Council, declaring that the whole of the tomatoes produced in the Petty Sessions Districts of Maroochy, Caboolture, Esk, Woodford, Kilcoy, Redcliffe, Brisbane, Cleveland, Southport, Logan, Beaudesert, Wynnum, Goodna, Ipswich, Marburg, Laidley, Lowood, Harrisville, Dugandan, and Rosewood shall be acquired by the Committee of Direction of Fruit Marketing for the period from the 15th September, 1931, to the 15th December, 1931.

The present acquisition has been sought by the Committee of Direction for a similar purpose to the acquisition of last year. The object is to restrict or prohibit the forwarding of immature or blight-affected tomatoes to the Southern markets.

Canegrowers' Council—Amended Regulation.

The Governor in Council has approved of the issue of Regulations under "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1930,*" amending "The Queensland Cane Growers' Council Regulations of 1931," which were approved on the 13th August, 1931, and which provide for the conduct of meetings of the Queensland Cane Growers' Council, District Cane Growers' Executives, Mill Suppliers' Committees, and also the business of the Annual Conference of the Sugar Industry.

The amendments to the above include a slight alteration of Regulation No. 330, and also the addition of two new Regulations Nos. 328A and 355A.

Staff Changes and Appointments.

Constable T. C. D. Monaghan, of Goomeri, has been appointed also an inspector under "*The Slaughtering Act of* 1898."

The Officers in Charge of Police at Caboolture, Canungra, Coomera, Gatton, Harrisville, Helidon, Kilcoy, Moore, Nerang, and Yarraman have been appointed also Acting Inspectors of Stock as from the 29th August, 1931.

Messrs. W. J. James, S. K. Short, and W. Jones, of the Townsville Gun Club, have been appointed Honorary Rangers under "*The Animals and Birds Acts, 1921 to* 1924."

Mr. John R. MacGregor, Cairns, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Miss S. Wilkinson has been appointed an Assistant Cane Tester at the Moreton Mill for the forthcoming sugar season.

Mr. Sydney Schmidt, Island Plantation, via Maryborough, has been appointed an Honorary Ranger under the Native Plants Protection Act.

The following members of the Committee of the National Parks Association of Queensland have been appointed Honorary Rangers under the Native Plants Protection Act:—Messrs. R. W. Lahey, M. P. M. Campbell, G. H. Barker, A. Groom, J. E. Young, J. Nebe, J. A. Watson, C. Kemp, H. L. O'Reilly, A. B. O'Reilly, Professor E. J. Goddard, D.Sc., and Dr. E. O. Marks; Misses W. Moore and D. F. King, and Mrs. W. M. Mayo.

Valedictory—Mr. J. C. Brunnich, F.I.C., F.C.S., F.A.C.I.

Mr. J. C. Brünnich, on the occasion of his retirement from the position of Agricultural Chemist, Department of Agriculture and Stock, was presented with a wallet of notes by the Minister for Agriculture (Mr. Harry F. Walker) on behalf of the staff of the Department.

The Minister said that Mr. Brünnich had served thirty-five years with the Department. No man was looked upon with greater respect and confidence. The service that he had given to the whole of Queensland was an example that could well be followed. No man in the Department had given better service. On account of his wide knowledge, Mr. Brünnich was probably the greatest authority on his subject in Australia. He had been particularly pleased with Mr. Brünnich's administration of his branch.

Other speakers referred to the establishment by Mr. Brünnich of what they considered to be the finest agricultural laboratory in Australia, the proficiency of the men whom he trained, and his work for the sugar industry.

Mr. Brünnich, who was greatly affected by the demonstration of his colleagues' esteem, expressed his heartfelt regret at leaving the Department and the laboratory he loved, and which he regarded as his child. He said that he was sorry that some of his recommendations had been lost, for various reasons, and that some of the work done had remained hidden. He felt his severance from the service, which had been made necessary by the inexorable passage of time, very keenly; and would carry with him into retirement many happy memories of the Department and of his associates who were doing work of immeasurable value for both the State and Commonwealth.

Mr. Brünnich was subsequently entertained by a number of immediate friends and former students at a dinner party at the Carlton Cabaret. Mr. E. H. Gurney presided, and those present were Messrs. A. B. Chater, T. McCall, F. Connah, C. H. O'Brien, W. G. McKechnie, L. A. Meston, A. Hurwood, G. R. Patten, F. Bennett, W. Cartmill, W. Winks, N. Cassidy, A. Webb, J. MacGibbon, F. Barry-Smith, C. R. von Stieglitz, O. Kent, Dr. H. W. Kerr, and Dr. K. Brünnich.

Protection of Native Plants.

"*The Native Plants Protection Act of* 1930" was passed last session, and is designed to prevent the wholesale destruction of our native plants, ferns, and orchids. A Proclamation has been issued declaring that the provisions of this Act shall come into force on the 18th July, 1931, and Orders in Council have been approved which provide that the whole of the State of Queensland shall be a district for the purposes of the Act, and that the following native plants shall be protected throughout Queensland:—

FERNS.

Botanical Name.	Vernacular Name.
Alsophila australis	Tree Fern
Alsophila excelsa	Tall Tree Fern
Alsophila Leichhardtiana	Prickly Tree Fern
Alsophila Robertsoniana	Robertson's Tree Fern
Alsophila Rebeccæ	Broad-leaved Tree Fern
Alsophila Baileyana	Wig Tree Fern
Dicksonia antarcitica	Mountain Tree Fern
Dicksonia Youngiæ	Young's Tree Fern
Davallia pyxidata	Hare's Foot Fern
Adiantum æthiopicum	Common Maiden Hair Fern
Adiantum hispidulum	Five-fingered Maiden Hair
Adiantum formosum	Scrub Maiden Hair Fern
Asplenium nidus	Birds' Nest Fern
Asplenium simplicifrons	Narrow-leaved Birds' Nest Fern
Platycerium grande	Stag Horn Fern
Platycerium alcicorne	Elk Horn Fern

PALMS.

Archontophœnix alexandre	Northern Piccabean
Archontophœnix Cunninghamii	Southern Piccabean
Bacularia monostachya	Walking Stick Palm
Licuala Muelleri	Fan Palm
Livistona australis	Cabbage-tree Palm
Drymophlœus Normanbyi	Black Palm

ORCHIDS.

Dendrobium bigibbum	Purple Orchid
Dendrobium phalænopsis	Large Purple Orchid
Dendrobium superbiens	Torres Strait Orchid
Dendrobium undulatum	Curly Orchid
Dendrobium speciosum	King Orchid or Rock Lily
Dendrobium fusiforme	
Dendrobium delicatum	
Dendrobium tetragonum	Spider Orchid
Dendrobium æmulum	Box-tree Orchid
Dendrobium Kingianum	
Dendrobium gracilicaule	Slender Orchid
Dendrobium canaliculatum	Tea Tree Orchid
Dendrobium linguiforme	Tongue Orchid
Dendrobium teretifolium	Pencil Orchid
Dendrobium Beckleri	Small Pencil Orchid
Phaius grandifolius	Common Phaius
Phaius Bernaysii	Yellow Phaius
Calanthe veratrifolia	Scrub Lily
Cymbidium canaliculatum	Arrowroot Orchid
Cymbidium albusiflorum	Long-leaved Arrowroot Orchid
Cymbidium suave	Slender Arrowroot Orchid
Sarcochilus Hartmanni	
Sarcochilus Fitzgeraldi	

MISCELLANEOUS PLANTS.

Hoya australis	Hoya or Wax Flower
Cordyline terminalis	Palm Lily
Lycopodium phlegmaria	Tassel Fern

The effect of the protection is that it will be unlawful to pick a protected native plant which is growing on any Crown land or State forest or National park, or any public park dedicated for public purposes, or on any private land without the permission of the owner of such land.

It will further be an offence to sell a protected native plant unless it can be proved that such protected plant was grown on private land and was taken with the permission of the owner.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

RECENT RESEARCH ON VITAMINS.

Our ideas as to the nature and value of vitamins are changing. We no longer regard them as mysterious, or perhaps unreal, substances of unknown chemical composition. Nor do we any longer think of them exclusively as substances whose total absence from our food leads to a few peculiar diseases such as rickets, scurvy, beri-beri, and pellagra. Our ideas have become more definite and also broader. We have become more concerned about relative deficiency of all the vitamins, which is a very common and serious condition, rather than about the absolute deficiency of any one of them, which is comparatively rare.

A Life and Death Difference.

The chemical composition of vitamin D is rapidly becoming known. This vitamin can now be manufactured in any desired quantity, and has even been prepared in pure crystals. Research into the chemistry of the other vitamins is not yet so advanced, but recent work on vitamins A and B gives much promise of similar success. In another direction an even more important advance has been made. We are all of us continually subject to the attacks, in varying intensity, of the disease germs which cause influenza, suppuration, pneumonia, consumption and many other diseases. Yet we do not all catch those diseases, and of those who do catch them, some get them in a mild form and soon recover; others suffer severely and may die. Human beings are more or less resistant to infectious diseases. The nature of this resistance is still imperfectly understood, but we know that it is partly due to the formation in the body of chemical substances, which we call antibodies. It has now been proved that one very important factor in the establishment of resistance to disease is the presence of an adequate supply of vitamins in the diet. This is surely a discovery of great importance. Vitamins may make the difference between good health and bad health, and often between life and death.

This truth has lately been made very clear by a long series of experiments carried out in India by a distinguished scientist named McCarrison. Some 1,000 white rats were kept under ideal sanitary conditions until they were two years old (which would correspond to about 45 or 50 in the human being). They were fed on a diet similar to that eaten by certain peoples of Northern India, among whom some of the finest physical specimens of mankind are to be found. It consisted of whole wheat flour, unleavened bread lightly smeared with fresh butter, sprouted peas, fresh raw carrots and cabbage, fresh milk, a small ration of raw meat with bones once a week, and plenty of water. For over two years there was no case of illness and no death among these 1,000 rats. The most careful post mortem examinations showed them to be remarkably free from disease. They had large litters, the average being eight, but often twelve or fifteen, and the mothers invariably reared the whole of their young.

Side by side with these were shelters containing several thousand white rats under equally ideal sanitary conditions, but fed on various deficient diets. Of all faulty diets used, that composed of white bread, margarine, tea, sugar, jam, preserved meat, and scanty over-cooked vegetables—a diet in common use in England and in Australia (except that we use butter instead of margarine)—proved to be one of the worst. These rats suffered from a multitude of diseases. We can name some only—pneumonia, sinus disease, pus in the middle ear, adenoids, eye diseases, gastric ulcer, enteritis, stone in the kidney and bladder, premature births and still-births, abscesses, anaemia, inflamed glands, goitre, neuritis, heart disease. It was conclusively proved that a diet poor in animal fats, milk, and fresh vegetables will induce in rats a host of diseases well known to afflict human beings.

Vitamin Content of Common Foods.

Is it conceivable that these results have no application to human beings? Surely our population, with its large percentage of rejects for military service and its numerous hospitals filled with these very diseases, might learn some lesson from it. So might our mothers, for though vitamins are necessary at all ages, during infancy and childhood they are necessary for development as well as health.

Let me enumerate our common foods which contain no vitamins. They are butcher's meat, canned meat, bacon, dripping, white bread, white flour, biscuits (except granose and shredded wheat made with whole grains), rice, tapioca, sago, cornflour, sugar, jam, tea. We do not say that these foods should not be eaten in moderation; but those who try to live on them exclusively will not live healthy, and are not likely to live long. Only when taken together with a liberal supply of food containing vitamins are they wholesome.

The most important vitamin-containing foods are milk, butter, cheese, eggs, green vegetables (if cooked rightly—they must not be boiled long nor with soda, nor should more water be used than necessary; if any drains away it should be taken in soup, for it contains the vitamins), salads, liver, kidneys and tripe. Special vitamins are contained in carrots, potatoes, wholemeal bread, whole wheatmeal and oatmeal, bran, tomatoes, oranges, lemons, and other fruits, peas, and beans.

THE COUNTRY WOMAN.

By arrangement with the Domestic Science and Technical Services of the Department of Public Instruction, information of especial interest to country women is published regularly under this heading.

SIMPLE COOKERY.

OATMEAL PORRIDGE.

Materials—1 oz. oatmeal; ½ pint water; pinch salt.

Utensils—Saucepan; wooden spoon.

Method—

1. Soak oatmeal in part of the water; put remainder of water into saucepan over the fire.
2. When the water boils, add soaked oatmeal.
3. Stir till it boils; add salt.
4. Simmer for 1 hour; stir occasionally.

CHEESE CAKES.

Materials—For pastry: ¼ lb. lard; ½ lb. flour; ½ gill water; ½ teaspoonful baking-powder; 3 tablespoonfuls of jam. For cake mixture: 3 oz. butter or dripping; 3 oz. sugar; 2 eggs; 5 oz. flour; 1 teaspoonful baking-powder.

Utensils—Bowl; wooden spoon; sieve; teaspoon; rolling-pin.

Method—

1. Sift flour, baking-powder, and salt into a bowl.
2. Rub lard in with the tips of fingers.
3. Add water; make into a dry dough.
4. Place on a floured board; roll out thin; cut with round cutter.
5. Place in patty tins.
6. Put half a teaspoonful of jam in centre of pastry.
7. Cover with cake mixture.
8. Bake in a moderately hot oven for 20 minutes.

Cake Mixture.

1. Place butter or dripping and sugar in a bowl.
2. Beat till creamy.
3. Add eggs one by one.
4. Add flour mixed with baking-powder.

GRILLED CHOPS.

Materials—1 lb. chops; 1 teaspoonful butter or dripping; pinch of salt and pepper.
Utensils—Knife; gridiron; dish.

Method—

1. Trim the chops; remove fat.
2. Rub chops over with a little butter or dripping.
3. Place on gridiron.
4. Grill 3 minutes on each side.
5. Place on a hot dish.
6. Spread lightly with butter; sprinkle with salt and pepper.

BOILED CABBAGE.

Materials—1 small cabbage; 1 teaspoonful salt; 2 pints water; ¼ teaspoonful soda; pepper; ½ teaspoonful butter.
Utensils—Bowl; knife; saucepan; dish.

Method—

1. Remove outside leaves and cut cabbage into suitable pieces.
2. Soak in salt and water for half an hour to remove dirt or insects.
3. Put water into a saucepan on the fire; bring to the boil.
4. Add cabbage, salt, and soda.
5. Boil 15 minutes.
6. Strain; press; cut up finely; sprinkle with pepper; add butter; serve on a hot dish.

MASHED POTATOES.

Materials—1 lb. potatoes; 1 teaspoonful salt; 1 pint water; ¼ cup milk; 1 dessertspoonful butter or lard.
Utensils—Bowl; knife; saucepan; fork; masher; dish.

Method—

1. Wash old potatoes; peel thinly.
2. Cut into even-sized pieces.
3. Put into a saucepan; cover with cold water.
4. Add salt; put on lid; boil till tender.
5. Strain off water; dry; mash.
6. Add butter or lard and milk.
7. Beat well; serve.

BREAD AND BUTTER PUDDING.

Materials—2 eggs; 1 pint milk; 1 dessertspoonful currants or sultanas; 1 dessertspoonful sugar; 2 slices bread and butter; grating of nutmeg.
Utensils—Bowl; whisk; knife; grater; pie dish; baking tin.

Method—

1. Break eggs into a basin; beat well.
2. Pour in milk; add sugar.
3. Grease a pie dish; place in it layers of thin bread and butter.
4. Add washed currants or cleaned sultanas; pour eggs and milk over all; allow to stand for quarter of an hour.
5. Grate nutmeg over top; put pie dish into a baking tin having water in it about 1 inch deep.
6. Bake in a very slow oven three-quarters of an hour.

SCONES.

Materials—½ lb. flour; ½ teaspoonful salt; 1 dessertspoonful lard; ⅔ cup milk; 1 tablespoonful milk for brushing over; ½ teaspoonful carbonate of soda; 1 teaspoonful cream of tartar.
Utensils—Bowl; sieve; board; knife; baking tin; brush.

Method—

1. Sift flour, soda, cream of tartar, and salt into a bowl.
2. Rub in lard with tips of fingers.
3. Add milk; make into a dough.
4. Place on a board; work lightly; press out; shape into two round pieces.
5. Divide each piece into four pieces; place on a floured tin; brush over with milk.
6. Bake in a hot oven for 20 minutes.

ROAST LOIN OF MUTTON.

Materials—Loin mutton; 1 tablespoonful flour; 2 pinches pepper; salt; 1 tablespoonful water.

Utensils—Cloth; baking-dish; trivet; iron spoon.

Method—

1. Wipe meat well with a damp cloth; weigh it; separate joints.
2. Sprinkle with flour, pepper, and salt.
3. Heat dripping in baking-dish; add water.
4. Place meat on a trivet in a baking-dish.
5. Bake in a hot oven, basting every 30 minutes; allow 15 minutes for each lb. and 15 minutes over.

BEEF TEA.

Materials—½ lb. gravy beef; ½ pint water; 1 piece of bread; pinch of salt.

Utensils—Jar; saucepan; cup; basin; knife.

Method—

1. Wipe meat with damp cloth; remove fat and gristle; cut or shred meat across the grain; soak it in cold water for half an hour.
2. Put meat and water into a jar; stand jar in a saucepan of hot water.
3. Place on stove; keep water in saucepan at simmering point for 30 to 40 minutes.
4. Add salt; stir well; remove meat.
5. Serve in a cup; with sippets of toast.

BAKED POTATOES.

Materials—1 lb. potatoes; pepper; salt.

Utensils—Basin; knife; baking-tin; fork; vegetable dish.

Method—

1. Wash and peel potatoes thinly.
2. Cut into pieces of even size.
3. Place in baking-dish in the dripping under meat.
4. Sprinkle with pepper and salt.
5. Cook for 35 to 40 minutes.
6. Serve in a hot vegetable dish.

BOILED LIMA BEANS.

Materials—1 cup of beans; 1 teaspoonful salt; pinch of soda.

Utensils—Bowl; saucepan; dish.

Method—

1. Soak beans in water over-night.
2. Put water in a saucepan over the fire; when hot, add beans, salt, and soda.
3. Boil till tender; drain.
4. Serve with white sauce in a hot vegetable dish.

WHITE SAUCE.

Materials—1 dessertspoonful butter or lard; 1 dessertspoonful flour; ½ pint milk; ¼ teaspoonful salt.

Utensils—Saucepan; wooden spoon.

Method—

1. Heat butter or lard in a saucepan.
2. Add flour; mix well; add salt.
3. Add milk gradually, stirring all the time.
4. Cook for 3 minutes.

INVALID COOKERY.

Renewal of Waste in the Body.

The animal cell in the human body is made up of water, protein, carbohydrates, fat, mineral matter. Foodstuffs are made up of water, protein, carbohydrates, fat, mineral matter. Some of the proteins in animal cells are albumen, globulin, myosin, fibrinogen. Some of the proteins in foodstuffs are albumen, globulin, casein,

gluten. The carbohydrates in animal cells are sugar and glycogen. The carbohydrates in foodstuffs are sugar, starch, and cellulose. Animal cells are used up as long as the animal is alive; and this waste of cell stuff must be made good by taking suitable food. In the body, therefore, the loss of water must be made good by water, protein by protein, carbohydrates by carbohydrates, and so on. The protein and carbohydrates in foodsuffs are assimilated to the protein and carbohydrates of the body during the processes of digestion and absorption.

A Calorie is the amount of heat required to raise 1 kilogram of water 1 deg. C.

	Calories per hour.
A man sleeping requires	65
A man sitting at rest requires	100
A man at light muscular work requires	170
A man at active muscular work requires	290
A man at severe muscular work requires	450
A man at very muscular work requires	600

(Attwater and Benedict).

Approximate Food Requirements for One Day.

	Calories.
Man doing light muscular work	3,000 to 3,500
Woman doing light muscular work	2,700
Boy, 14 to 17 years	2,500 to 3,000
Girl, 14 to 17 years	2,200 to 2,600
Children, 10 to 13 years	1,800 to 2,200
Children, 2 to 5 years	1,200 to 1,500
Children, 1 to 2 years	900 to 1,200

Analysis of the Processes of Digestion.

What we speak of as digestion of food embraces the following actions or processes:—

(*a*) Food is taken into the mouth.
(*b*) It is masticated by the teeth.
(*c*) It is moistened and changed by the alkaline saliva.
(*d*) It is swallowed by the muscular contraction of the tongue, pharynx, and throat, passed down the æsophagus by peristaltic contraction into the stomach.
(*e*) It is there diluted by the addition of acid gastric juice.
(*f*) Movements of the muscular walls of the stomach help to mix the food and digestive juice thoroughly.
(*g*) The semi-solid food is reduced to a thick liquid called chyme, and its protein contents are changed.
(*h*) When the chyme has reached a certain state of acidity the opening of the pylorus allows the food to pass into the duodenum.
(*i*) Here a duct supplied by two branches pours bile from the liver and pancreatic juice from the pancreas into the chyme in the duodenum. Any starch which has remained unchanged becomes sugar; proteins are split into simpler substances and fat is emulsified.
(*j*) The result of these changes and of the addition of fluid reduces the chyme to what is called chyle.
(*k*) Glands in the walls of the intestine add intestinal juice (succus entericus) to the chyle.
(*l*) In this diluted state the food is absorbed by fine velvety processes called villi thickly distributed over the lining of the intestines; each process contains a network of blood vessels and one or more tubes called lacteals. The blood vessels receive from the chyle water with protein, sugar and salt in solution, and carry these foods to the portal vein. The lacteals receive the emulsified fat and convey it to the lymphatics. These vessels pour their contents into the thoracic duct, which in its turn is connected with the jugular vein.

In these ways the foodstuffs are treated in the alimentary canal, made fit to nourish the cells, and conveyed to the circulatory system for distribution throughout the body.

Digestive Juices.

1. *Saliva*—Water, salts, ptyalin which changes starch into sugar.
2. *Gastric juice*—Water, hydrochloric acid, rennin which curdles milk, pepsin which splits protein.

3. *Pancreatic juice*—Water, salts, trypsin which splits protein, amylopsin which changes starch into sugar, steapsin which splits fat.

4. *Bile*—Water, salts, cholesterin; bile emulsifies fat.

5. *Succus entericus*—Water, salts, a ferment which acts on sugar.

The following is a summary of the parts of the alimentary canal, the means by which they assist digestion, the kinds of food that each acts upon, and the action that results therefrom:—

Part of the Alimentary Canal.	Glands.	Secretion.	Food which this Secretion acts upon.	What this Food is changed into.	How the Product gets to the Blood.	What this Product is used for in the Body.
1. Mouth ..	Salivary (3)	Saliva	Starch	Sugar	By capillaries of portal vein	Producing heat, energy, and for the producing of fat
2. Stomach ..	Gastric	Gastric juice	Proteins	Peptones	By capillaries of portal vein	Building tissue and the production of heat and energy.
..	Liver	Bile	Fats	Emulsion	By lacteals and lymphatics	As in 1st
3. Small Intestine	Pancreas	Pancreation juice	Starch sugar proteins fat	Dextrose maltose amino acids emulsion	See line 2	As in 1st and 2nd
	Intestinal	Succus Entericus	Cane sugar	Dextrose	See line 2	As in 1st

LIQUIDS AND THEIR PREPARATION.

Milk is perfect food for young children and invalids; because it contains everything necessary to build tissue and produce energy. The curd forms tissue. Milk fat and milk sugar are energy producers. It should be the most important article in the diet of children up to the age of five years. For older children and healthy adults it contains too much protein and fat and too little iron; infants kept too long on milk alone become anæmic; if there is difficulty in digesting milk, it may be diluted with barley, rice, or lime water.

Lime and salt form bone and keep the body healthy.

Whey is a soothing drink, easily digested; all curd must be strained from it; rennet, wine, or lemon juice may be used in making whey.

Lime Water.—Lime water should be strained when perfectly clear; it neutralises acidity of the stomach; a dessertspoonful in milk or in any liquor which contains milk does not affect the flavour and renders it more digestible.

Grains.—Grains such as barley and rice must be washed well in three waters. If barley is not well washed, barley water will have a bluish appearance; barley may be used twice for an infusion; the decoction must be simmered for two hours. Barley water may be made without flavouring; milk may be added after straining. Carolina rice is best for rice water; a tablespoon of sherry or port may be added to rice water; flavour may be varied by using ginger or cinnamon.

Oatmeal Water.—There are three kinds of oatmeal—coarse, medium, fine. Coarse meal is the best because nourishing parts of the grain are lost in the refining. Meal must be fresh, and should be kept in a dry place. Damp oatmeal tastes bitter. Oatmeal water is strained to exclude husks.

Chocolate must not be boiled longer than necessary; half water and half milk may be used; cheap chocolate should be avoided.

Toast Water.—Crust of bread is best for making toast water as it does not turn sour; both sides should be toasted until dry and nicely browned; directly the water is coloured it should be strained.

Apple Water.—Fresh, juicy, sharp-flavoured apples are best; they must be washed, not peeled, and thinly sliced; the water used must be freshly boiled.

Lemonade.—Lemons should be wiped and rolled on the table to soften them; the minutest portion of white pith will make lemonade bitter; barley, rice, or soda water may be used instead of water.

Linseed Tea.—The whole linseed must be used; if linseed is bruised the tea will be bitter.

Tea.—Good tea is free from dust and stalks; fragrance is the best test; the water must be freshly boiled, because the loss of gases in continued boiling changes the water; the kettle must be clean inside and out; the teapot should be heated; five minutes should be allowed for infusion.

Coffee should be freshly roasted and ground; if that is impossible it should be bought in small quantities and kept in a box with a tight-fitting lid. If liked, chicory may be added in the proportion of 1 oz. to ½ lb. coffee; the water must be freshly boiled; milk should be scalded but not quite boiled; for strong coffee equal quantities of coffee and milk should be used.

FRUIT PRESERVING.

Strawberry Jam.

Method—

1. Wash and remove stems from strawberries; cut fruit into halves.
2. Put into preserving pan; add sugar.
3. Stir well, remove scum, add lemon juice.
4. Boil till a small quantity will jelly.
5. Put into jars; seal down airtight.

Utensils—Bowl, knife, preserving pan, wooden spoon, squeezer, jars.

Materials—For each lb. of strawberries allow 1 lb. sugar and 1 teaspoonful of lemon juice.

Strawberry Conserve.

Method—

1. Wash and pick stems from strawberries.
2. Put whole fruit into preserving pan, add sugar.
3. Stir, remove scum, add lemon juice.
4. Boil till a small quantity will jelly.
5. Put into jars, seal down airtight.

Utensils—Bowl, knife, preserving pan, wooden spoon, squeezer, jars.

Materials—To each 1 lb. strawberries add 1 lb. sugar and 1 teaspoonful lemon juice.

Note.—When strawberries are plentiful, juice obtained by crushing part of the fruit may be used to make syrup with the sugar. The whole fruit are then cooked in the syrup.

Strawberry Syrup.

Method—

1. Wash and stem strawberries.
2. Crush fruit in a fine sieve over a bowl; measure juice.
3. Put juice into a preserving pan; add sugar and acid dissolved in water.
4. Boil for ten minutes.
5. Strain and bottle; seal down.

Utensils—Knife, sieve, wooden spoon, cup, strainer, bottles.

Materials—To each cup of juice allow ¾ cup sugar and 1 crystal of citric acid.

Note.—Jam may be made from the pulp left in the strainer by adding 1 cup of sugar to each cup of pulp, and boiling till a small quantity jellies on a plate.

AUGUST AND SEPTEMBER.

Cape Gooseberry Jam.

Method—

1. Wash fruit; pick it over carefully; drain and dry fruit.
2. Bruise some ripe berries in the bottom of the preserving pan.
3. Boil for fifteen minutes; add remainder of fruit.
4. Add sugar; boil for one hour.
5. Let the jam stand in the preserving pan till it is cool.
6. Bottle and cover.

Utensils—Bowl, sieve, cloth, preserving pan, wooden spoon, jars.

Materials—1 cup sugar to each cup of fruit.

Cape Gooseberry Conserve.

Method—

1. Pick fruit over carefully; wash, drain, and dry it.
2. Prick fruit with a darning needle or long pin; put it into a preserving pan.
3. Add sufficient water to keep it from burning.
4. Boil for thirty minutes; add sugar.
5. Cook till a small quantity jellies on a cool plate.
6. Allow to cool in pan before bottling.

Utensils—Bowl, sieve, cloth, needle or long pin, wooden spoon, preserving pan, jars.

Materials—1 cup of sugar to each cup of fruit; 2 cups of water to 6 lb. fruit.

Loquat Jam.

Method—

1. Cut off tops of loquats, remove seeds, and put them into a bowl.
2. Cover with boiling water, allow to stand half an hour.
3. Strain liquid over the fruit.
4. Boil gently thirty minutes or until fruit is tender.
5. Add sugar and boil twenty minutes or until the jam jellies from the spoon.
6. Put jam into jars while hot.

Utensils—Preserving pan, bowl, cup, wooden spoon, preserving jars.

Materials—Loquats; 1 cup sugar to 1 cup pulp.

Loquat Jelly.

Method—

1. Cut tops and ends from loquats.
2. Put fruit into a preserving pan; add sufficient water to come halfway up the fruit.
3. Boil till tender.
4. Strain; measure juice; add 1 cup of sugar to 1 cup of juice.
5. Boil juice till a small quantity will jelly.
6. Put into jars; seal down airtight.

Utensils—Knife, preserving pan, strainer, cup, jars.

Materials—Loquats; 1 cup sugar to each cup of juice.

Note.—The amount of water depends on the juiciness of the fruit.

Pineapple Jam.

Method—

1. Remove cores; scrape out pulp finely.
2. Cover bottom of preserving pan with water; add pulp.
3. Cook gently till tender.
4. Measure pineapple pulp.
5. Add 1 cup of sugar to 1 cup of pulp.
6. Boil till a small quantity allowed to drop on a plate sets.
7. Put into jars when slightly cool; cover down airtight.

Utensils—Preserving pan, spoon, cup, jars.

Materials—Pineapples; 1 cup sugar to each cup of pulp.

Pineapple and Pie-melon.

Method—

1. Peel melon and pineapples; remove eyes and core of pineapples.
2. Cut melon into dice, removing seeds; cut pineapple into dice.
3. Put into a preserving pan.
4. Add water.
5. Boil till tender.
6. Measure pulp; add 1 cup of sugar to 1 cup of pulp.
7. Boil till a small quantity allowed to drop on a plate sets.
8. Put into jars, cover, label.

Utensils—Preserving pan, knife, cup, jars.

Materials—Pie-melon; pineapple; 1 cup sugar to each cup of pulp; sufficient water to come half-way up fruit in preserving pan.

Preserved Pineapples.

Method—

1. Peel; remove cores and eyes from pineapples.
2. Cut into even-sized pieces.
3. Put into preserving pan of syrup.
4. Cook till tender.
5. Arrange in preserving jar.
6. Cover well with syrup.
7. Secure rubber, and cover down airtight.

Syrup—

1. Put sugar into preserving jar.
2. Add water, stir.
3. Boil for ten minutes.

Utensils—Preserving pan, knife, rubber rings, jars.

Materials—Pineapples; 1 cup sugar to 1 cup water.

Preserved Pineapples (second method).

Method—

1. Peel pineapples; remove eyes.
2. (*a*) Leave the fruit whole; or
   (*b*) Cut each pine into quarters lengthwise, removing cores; or
   (*c*) Cut fruit into slices about ¾ in. thick.
3. Pack fruit carefuly and neatly in wide-mouthed jars; when full place a knitting needle in the jar.
4. Pour boiling syrup over the fruit till the jar is brim full. For syrup *see* Preserved Pineapples (First Method).
5. Seal down; place in canner; bring slowly to 160 deg.; keep at that temperature for 15 minutes.
6. Allow to cool slowly.

Utensils—Knife, jars, saucepan, knitting needle, canner.

Materials—Pineapples; 1 cup sugar to each cup of water.

Crystallised Pineapple.

Method—

1. Remove skin and eyes from pineapple.
2. Cut into thick slices; divide slices into quarters.

3. Boil sugar and water together for ten minutes.
4. Add pineapple; cook till tender.
5. Pour out into a basin; cover; stand overnight.
6. Return syrup to preserving pan; bring to the boil.
7. Pour reduced syrup over pineapple; cover; stand for three days.
8. Repeat 6 and 7.
9. Lift pineapple out of syrup, place on sieve.
10. Dry in a warm oven until the pineapple does not stick to fingers; sprinkle with dry sugar.

Utensils—Knife, preserving pan, basin, sieve.

Materials—1 large pineapple; 4 cups sugar, 2 cups water.

Cherry Jam.

Method—

1. Wash cherries and put them into a preserving pan; add water.
2. Boil till tender, removing seeds as they rise; measure pulp.
3. Add 1 cup sugar to 1 cup of pulp.
4. Boil till a small quantity will jelly.
5. Put into jars, cover down airtight.

Utensils—Knife, preserving pan, cup, jars.

Materials—Cherries; sufficient water to come halfway up fruit; 1 cup sugar to each cup of pulp.

LAUNDRY WORK.

IRONING AND FOLDING.

1. The ironing table, skirtboard, shirt boards, and sleeve boards must be covered with felt or two thicknesses of blanket and a perfectly clean white sheet or cover.

2. The table or skirtboard must be placed so that the light falls on the articles to be ironed.

3. The iron stand should be placed on the right-hand side.

4. The irons must be perfectly clean. Beeswax and cloths for rubbing the irons must be ready in a convenient place.

5. *To clean irons*—

(*a*) Sprinkle fine sand or bath brick dust thickly on a piece of sacking.
(*b*) Rub the iron firmly over the sand or dust.
(*c*) Wipe irons on a waxed cloth.
(*d*) Polish with a clean cloth.

6. *To test the heat of an iron*—

Dip the tip of a finger in cold water and apply it quickly to the face of the iron. If the water changes into steam immediately with a hissing sound, the iron is sufficiently heated.

7. Various kinds of irons are:—Flat or sad irons, charcoal, gas, electric, petrol, polishing, and goffering.

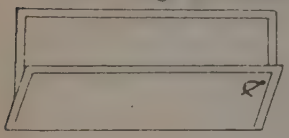
Table Covers—

1. Place the cloth on the table with the right side uppermost. The cloth may be folded and each fold ironed separately.
2. Use a fairly heavy iron so as to get a glossy surface.
3. Iron on the right side only, until the cloth is perfectly dry.
4. Fold by placing the selvedges together, right side inside; bring each selvedge back to touch the middle crease; roll the cloth up in the shape of a cylinder; tie with tape.

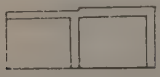
Note.—The cloth must be well aired before it is put away, or it will lose its gloss and firmness.

Serviettes—

1. Proceed as for table cover.
2. Iron right side first, then the wrong side.
3. Fold large serviettes in the sereen fold. Fold over one-third with the right side outside and the name, number, or initial in the top right-hand corner. Fold back the remaining third underneath, and repeat from left to right.



4. Small serviettes are folded by placing the selvedges together and doubling the selvedges down on the middle line. The oblong thus obtained is folded in half crossways twice.



Body Linens—

1. All small parts, such as frills and embroidery, should be ironed first.

Note.—Embroidery must be ironed on the wrong side only.

2. Bands and yokes must be ironed on both sides in order to dry them.
3. The body may then be ironed, taking the point of the iron well into gathers and drying every part thoroughly.
4. As most body linen has to be ironed double, care should be taken to smooth out the under part before the upper part is ironed.
5. Frills are improved by being goffered.

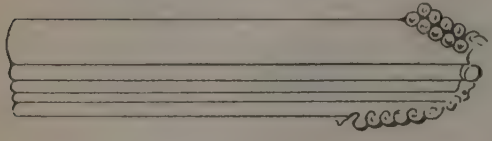
For goffering—

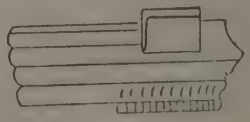
(*a*) Test the heated goffering iron on a piece of cotton.
(*b*) Place the garment flat on the table.
(*c*) If there is more than one frill, begin with the frill farthest from the edge of the garment.
(*d*) Take up a small piece of the frill between the prongs of the iron.
(*e*) Turn the iron to the right, drawing back the frill with the left hand.
(*f*) Work from right to left, keeping an even distance between each goffer.

6. Under-linen may be folded like a dress shirt to show all the front.

This method is called the "Front Fold." Usually it is folded in the "Side Fold."

The Side Fold.





Fold the garment in half, placing side seams together.

Arrange the fullness in pleats from the neckband or yoke, pressing each flat with a warm iron.

Turn over the shaped side pieces until the width is even at top and bottom.

Fold upwards from the bottom three or four times.

Turn so as to show embroidery or frills, folding sleeves underneath, but turning the trimming at the wrist back over the front.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Farm Notes for November.

Field.—Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growing fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kaffir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghums have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from

weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil, and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit it appears to be covered with a grey dust, and if the fruit is examined with a good lens, it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime-sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the

land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged at the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Bungundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

PROTECTING WATER TROUGHS.

Here is a device for preventing injury to stock and to the water trough itself. AA Fig. 1 are supports of hardwood or saplings let into the ground, bolted together at the top, and placed at intervals along the trough to carry the side-poles, BB and CC. These side-poles run the full length of the trough, and are bolted to the supports.

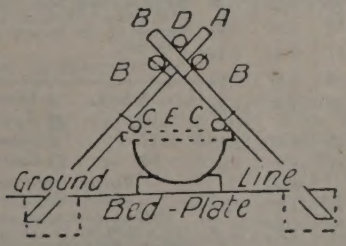


FIG 1.

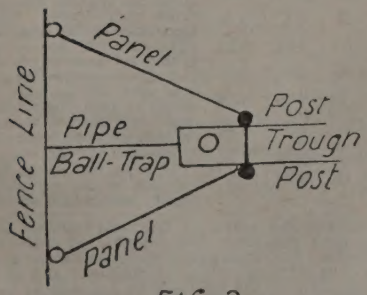


FIG. 2.

If the troughs are for watering stock the horizontal pole D is used instead of the side-poles BB. A temporary board is placed across the trough at E to carry the side-poles CC, but is withdrawn when these poles are bolted to the supports AA. Fig. 2 shows an arrangement for protecting the ballcock.—"Farmers' Advocate" (South Africa).

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	October, 1931.		November, 1931.		Oct., 1931.	Nov., 1931.
					MOONRISE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5.36	5.48	5.5	6.7	9.49	11.28
2	5.35	5.48	5.4	6.7	10.47	11.28
						a.m.
3	5.34	5.49	5.4	6.8	11.43	12.19
4	5.33	5.50	5.3	6.8	...	1.3
					a.m.	
5	5.32	5.50	5.2	6.9	12.39	1.41
6	5.31	5.51	5.2	6.10	1.39	2.15
7	5.29	5.51	5.1	6.10	2.25	2.47
8	5.28	5.52	5.1	6.11	3.7	3.23
9	5.27	5.52	5.0	6.12	3.44	3.58
10	5.26	5.53	4.59	6.13	4.20	4.40
11	5.25	5.53	4.59	6.14	4.55	5.23
12	5.24	5.54	4.58	6.15	5.30	6.21
13	5.23	5.54	4.58	6.16	6.8	7.20
14	5.22	5.55	4.57	6.16	6.50	8.21
15	5.21	5.55	4.57	6.17	7.40	9.24
16	5.20	5.56	4.56	6.18	8.37	10.23
17	5.19	5.56	4.56	6.19	9.36	11.21
					p.m.	
18	5.18	5.57	4.56	6.20	10.37	12.15
19	5.17	5.58	4.55	6.21	11.35	1.9
					p.m.	
20	5.16	5.58	4.55	6.22	12.33	2.1
21	5.15	5.59	4.55	6.23	1.29	2.53
22	5.14	5.59	4.54	6.23	2.21	3.43
23	5.13	6.0	4.54	6.24	3.16	4.39
24	5.12	6.1	4.53	6.25	4.5	5.36
25	5.12	6.1	4.53	6.25	4.59	6.34
26	5.11	6.2	4.53	6.26	5.51	7.27
27	5.10	6.3	4.53	6.27	6.46	8.29
28	5.9	6.3	4.52	6.27	7.46	9.25
29	5.8	6.4	4.52	6.28	8.40	10.16
30	5.7	6.5	4.52	6.29	9.38	11.2

Phases of the Moon, Occultations, &c.

5 Oct.	☽	Last Quarter	6 15 a.m.
11 „	●	New Moon	11 6 p.m.
20 „	☾	First Quarter	7 20 p.m.
26 „	○	Full Moon	11 34 p.m.

Perigee, 11th October, 2.30 p.m.
Apogee, 24th October, 2.54 p.m.

With the use of a telescope or binoculars Uranus would have been seen within 2 degrees South of the Moon about 6 p.m. on the 25th if it had not been for the Moon being very nearly full; but if the position is noted, and an observation made two or three days later, it will be seen that Uranus will be very slightly to the east of Epsilon and Delta Piscis, which, being of the 4th magnitude, are a good deal brighter than Uranus.

Mercury will rise 32 minutes before the Sun on the 1st October, and 12 minutes before it on the 15th.

Venus will set at 6.15 p.m. on the 1st, and at 6.39 p.m. on the 15th.

Mars will set at 8.16 p.m. on the 1st, and at 8.7 p.m. on the 15th.

Jupiter will rise at 3.7 a.m., and set at 1.55 p.m. on the 1st; on the 15th it will rise at 2.21 a.m., and set at 1.9 p.m.

Saturn will rise at 11.39 a.m., and set at 1.15 a.m. on the 1st; on the 15th it will rise at 10.49 a.m., and set at 12.20 a.m.

The Southern Cross, on the 1st October, will be upright at midday, and at its lowest position at midnight on or near the 150th meridian. Observers on either side of the meridian must allow 4 minutes earlier for each degree eastward, or later westward. At 6 p.m. the Cross will be 30 degrees west of the south celestial pole, and at 6 a.m. 30 degrees east of it, being horizontal in both of these cases. During the rest of the month allow 4 minutes earlier for each day.

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3 Nov.	☽	Last Quarter	5 17 p.m.
10 „	●	New Moon	8 55 a.m.
17 „	☾	First Quarter	12 13 p.m.
25 „	○	Full Moon	5 10 p.m.

Perigee, 9th November, 1.0 a.m.
Apogee, 21st November, 2.48 a.m.

Half an hour after sunset on November 1st observers will barely be able to catch a glimpse of Mercury close to the western horizon, but Venus will still be far enough above it to be seen more distinctly as it too sinks to the horizon. Mars will be higher up, by about one and-half times the length of the Southern Cross from Venus. These three planets will be apparently in the constellation Libra. Night after night they will become more distinctly observable as they get closer to one another. The culminating point of this interesting gathering will be on the 19th soon after midday, when Venus and Mars will seem almost to touch one another but will not be quite so close when darkness comes on. Mercury also will be remarkably close, being within one and a half degree of the other two planets.

After the 19th it will be interesting to watch the widening of the apparent distances between these planets half an hour or more after sunset.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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